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Vol. II

FORBES, Sir J., TWEEDIE, A., and CONOLLY, J.



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Vol. 2

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THE
CYCLOPÆDIA
OF
PRACTICAL MEDICINE;

COMPRISING
TREATISES ON THE NATURE AND TREATMENT OF DISEASES,
MATERIA MEDICA AND THERAPEUTICS,
MEDICAL JURISPRUDENCE,
ETC. ETC.

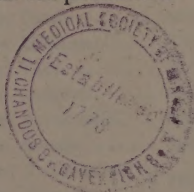
EDITED BY
JOHN FORBES, M.D. F.R.S.
PHYSICIAN TO THE CHICHESTER INFIRMARY, ETC.

ALEXANDER TWEEDIE, M.D.
PHYSICIAN TO THE LONDON FEVER HOSPITAL, ETC.

JOHN CONOLLY, M.D.
LATE PROFESSOR OF MEDICINE IN THE LONDON UNIVERSITY, ETC.

"Hæc demum sunt quæ non subgeſſit phantaſiæ imaginatricis temeritas ſed phænomena practica edocuere."—SYDENHAM.

VOL. II.
EME — ISC.



LONDON:
SHERWOOD, GILBERT, AND PIPER, AND BALDWIN AND CRADOCK,
PATERNOSTER-ROW;
WHITTAKER, TREACHER, AND CO., AVE-MARIA-LANE.

1833.

CONTENTS OF THE SECOND VOLUME.

	Contributors.	Page		Contributors.	Page
Emetics	<i>Dr. A. T. Thomson.</i>	1	Headach	<i>Dr. Burder.....</i>	379
Emmenagogues	<i>Dr. A. T. Thomson.</i>	9	Heart, Diseases of the	<i>Dr. Hope.....</i>	385
Emphysema	<i>Dr. Townsend.....</i>	14	Heart, Displacement } of the.....	<i>Dr. Townsend.....</i>	387
Emphysema of the } Lungs	<i>Dr. Townsend.....</i>	23	Heart, Fatty and } Greasy Degenera- } tions of	<i>Dr. Hope.....</i>	394
Empyema	<i>Dr. Townsend.....</i>	28	Hematemesis	<i>Dr. Goldie.</i>	394
Endemic Diseases....	<i>Dr. Hancock.</i>	47	Hemoptysis	<i>Dr. Law.</i>	399
Enteritis	<i>Dr. Stokes.</i>	54	Hemorrhage	<i>Dr. Watson..</i>	409
Ephelis	<i>Dr. Todd.....</i>	68	Hereditary Trans- } mission of Disease }	<i>Dr. Brown.</i>	417
Epidemics	<i>Dr. Hancock.</i>	71	Herpes	<i>Dr. A. T. Thomson..</i>	419
Epilepsy	<i>Dr. Cheyne.....</i>	88	Hiccup	<i>Dr. Ash.</i>	424
Epistaxis.....	<i>Dr. Kerr.</i>	100	Hooping-Cough	<i>Dr. Johnson.....</i>	428
ErethismusMercurialis	<i>Dr. Burder.</i>	104	Hydatids	<i>Dr. Kerr.....</i>	434
Erysipelas	<i>Dr. Tweedie.</i>	105	Hydrocephalus	<i>Dr. Joy.</i>	452
Erythema	<i>Dr. Joy.</i>	114	Hydropericardium ..	<i>Dr. Darwall.</i>	479
Expectorants	<i>Dr. A. T. Thomson.</i>	121	Hydrophobia	<i>Dr. Bardsley. . . .</i>	483
Expectoration.....	<i>Dr. Williams.....</i>	128	Hydrothorax	<i>Dr. Darwall.</i>	518
Favus	<i>Dr. A. T. Thomson.</i>	132	Hypertrophy	<i>Dr. Townsend.....</i>	523
Feigned Diseases .. { <i>Dr. Scott.</i> } <i>Dr. Forbes.</i> } <i>Dr. Marshall. . .</i> }		133	Hypertrophy of the } Heart	<i>Dr. Hope.</i>	535
Fever, General Doc- } trine of.....	<i>Dr. Tweedie.</i>	158	Hypochondriasis	<i>Dr. Prichard.....</i>	548
—Continued, and } its Modifications.. }	<i>Dr. Tweedie.</i>	165	Hysteria	<i>Dr. Conolly.....</i>	557
—Typhus	<i>Dr. Tweedie.</i>	175	Ichthyosis	<i>Dr. A. T. Thomson.</i>	586
—Epidemic Gastric.	<i>Dr. Cheyne.....</i>	215	Identity	<i>Dr. Montgomery..</i>	588
—Intermittent	<i>Dr. Brown.</i>	220	Impetigo	<i>Dr. A. T. Thomson.</i>	591
—Remittent	<i>Dr. Brown.</i>	235	Impotence	<i>Dr. Beatty.</i>	594
—InfantileRemittent	<i>Dr. Joy.....</i>	239	Incontinence of Urine.	<i>Dr. Cumin.....</i>	604
—Hectic	<i>Dr. Brown.....</i>	245	Incubus	<i>Dr. Williams.</i>	606
—Puerperal	<i>Dr. Lee.</i>	246	Indigestion	<i>Dr. Todd.</i>	608
—Yellow	<i>Dr. Gillkrest.</i>	264	Induration	<i>Dr. Carswell.</i>	670
Fungus Hæmatodes ..	<i>Dr. Kerr.</i>	298	Infanticide	<i>Dr. Arrowsmith. . .</i>	682
Galvanism	<i>Dr. Apjohn.....</i>	304	Infection	<i>Dr. Brown.</i>	698
Gastritis	<i>Dr. Stokes.</i>	316	Inflammation..... { <i>Dr. A. Crawford. }</i> <i>Dr. Tweedie }</i>		700
Gastrodynia	<i>Dr. Barlow.....</i>	327	Influenza	<i>Dr. Hancock.....</i>	815
Gastro-Enteritis	<i>Dr. Stokes.....</i>	334	Insanity	<i>Dr. Prichard.....</i>	824
Glossitis	<i>Dr. Kerr.</i>	344	Irritation	<i>Dr. Williams</i>	875
Glottis, Spasm of the.	<i>Dr. Joy.</i>	349	Ischuria Renalis	<i>Dr. Carter.....</i>	891
Gout	<i>Dr. Barlow.....</i>	352			

CONTRIBUTORS

TO THE

CYCLOPÆDIA OF PRACTICAL MEDICINE.

- JAMES APIJOHN, M.D. M.R.I.A. Professor of Chemistry to the Royal College of Surgeons in Ireland.
- R. ARROWSMITH, M.D. Physician to the Coventry Dispensary.
- EDWARD ASH, M.D. Physician to the Norwich Dispensary.
- JAMES L. BARDSLEY, M.D. Physician to the Manchester Royal Infirmary, Dispensary, &c.
- EDWARD BARLOW, M.D. Physician to the Bath United Hospital and Infirmary.
- THOMAS EDWARD BEATTY, M.D. Professor of Medical Jurisprudence to the Royal College of Surgeons in Ireland.
- JOHN J. BIGSBY, M.D. F.L.S. Senior Physician to the Newark Dispensary, Foreign Member of the American Philosophical Society, Philadelphia, &c. &c.
- J. BOSTOCK, M.D. V.P.R.S. F.L.S. F.G.S. &c.
- JOSEPH BROWN, M.D. Physician to the Sunderland and Bishopwearmouth Infirmary.
- THOMAS H. BURDER, M.D. Member of the Royal College of Physicians, London.
- JOHN BURNE, M.D. Physician to the Carey-street Dispensary.
- ROBERT CARSWELL, M.D. Professor of Morbid Anatomy in the University of London.
- H. W. CARTER, M.D. F.R.S.E. Fellow of the Royal College of Physicians, London, Physician to the Kent and Canterbury Hospital.
- JOHN CHEYNE, M.D. F.R.S.E. M.R.I.A. Physician General to the Forces in Ireland, &c.
- JAMES CLARK, M.D. F.R.S. Physician to St. George's Infirmary, &c. &c.
- HENRY CLUTTERBUCK, M.D. Physician to the General Dispensary.
- JOHN CRAMPTON, M.D. M.R.I.A. King's Professor of Materia Medica, Physician to Stevens's Hospital, &c. Dublin.
- ADAIR CRAWFORD, M.D. London.
- ANDREW CRAWFORD, M.D. Physician to the Hampshire County Hospital, Winchester.
- WILLIAM CUMIN, M.D. Member of the Faculty of Physicians, Glasgow.
- JOHN DARWALL, M.D. Physician to the Birmingham General Hospital.
- JOHN ELLIOTSON, M.D. F.R.S. Physician to St. Thomas's Hospital, and Professor of Medicine in the London University.
- J. GILLKREST, M.D. Deputy Inspector of Hospitals, London.
- GEORGE GOLDIE, M.D. Shrewsbury, late Physician to the York County Hospital.
- GEORGE GREGORY, M.D. Physician to the Small Pox Hospital.
- MARSHALL HALL, M.D. F.R.S. L.&E. &c. &c.
- THOMAS HANCOCK, M.D. Liverpool, Member of the Royal College of Physicians, London.
- CHARLES HASTINGS, M.D. Physician to the Worcester Infirmary, &c. &c.
- BISSET HAWKINS, M.D. Fellow of the Royal College of Physicians, Professor of Materia Medica and Therapeutics in King's College, London.
- J. HOPE, M.D. F.R.S. Member of the Royal College of Physicians, London, and Physician to the Mary-le-bone Infirmary.
- JAMES HOUGHTON, M.D. Physician to the South-Eastern Dispensary, Dublin.
- ARTHUR JACOB, M.D. M.R.I.A. Professor of Anatomy to the Royal College of Surgeons in Ireland.
- CHARLES JOHNSON, M.D. Professor of Midwifery to the Royal College of Surgeons, Dublin.
- WILLIAM BRUCE JOY, M.D. Fellow of the King and Queen's College of Physicians in Ireland, Physician to the Dublin General Dispensary.
- WILLIAM KERR, M.D. Physician to the Northampton General Infirmary.
- ROBERT LAW, M.D. Fellow of the King and Queen's College in Ireland, Physician Extraordinary to Sir Patrick Dun's Hospital.
- ROBERT LEE, M.D. F.R.S. Physician to the British Lying-in Hospital.
- CHARLES LOCOCK, M.D. Physician to the Westminster General Lying-in Hospital, &c.
- H. MARSH, M.D. M.R.I.A. Professor of the Principles and Practice of Medicine to the Royal College of Surgeons in Ireland, &c. Dublin.
- WILLIAM F. MONTGOMERY, M.D. Fellow and Professor of Midwifery to the King and Queen's College of Physicians in Ireland.
- J. A. PARIS, M.D. F.R.S. Fellow of the Royal College of Physicians, London.
- J. C. PRICHARD, M.D. F.R.S. Physician to the Infirmary and to St. Peter's Hospital, Bristol.
- JONES QUAIN, M.B. Professor of Anatomy and Physiology in the London University.
- ARCHIBALD ROBERTSON, M.D. Physician to the Northampton General Infirmary.
- P. M. ROGET, M.D. Sec. R.S. Consulting Physician to the Queen Charlotte's Lying-in Hospital and to the Northern Dispensary, &c.
- JOHN SCOTT, M.D. Edinburgh.
- WILLIAM STOKES, M.D. Physician to the Meath Hospital, Dublin.
- A. T. THOMSON, M.D. F.L.S. Professor of Materia Medica and Therapeutics in the London University.
- THOMAS THOMSON, M.D. F.R.S. L. and E. Regius Professor of Chemistry in the University of Glasgow, &c.
- T. J. TODD, M.D. Physician to the Dispensary, Brighton.
- RICHARD TOWNSEND, M.D. M.R.I.A. Fellow of the King and Queen's College of Physicians, Dublin.
- THOMAS WATSON, M.D. Fellow of the Royal College of Physicians, Physician to the Middlesex Hospital, and Professor of Medical Jurisprudence in King's College, London, &c. &c.
- JOHN WHITING, M.D. Member of the Royal College of Physicians, London, Physician to the Surrey Dispensary, &c.
- CHARLES J. B. WILLIAMS, M.D. Member of the Royal College of Physicians, London.

THE

CYCLOPÆDIA

OF

PRACTICAL MEDICINE.

EMETICS. (Φάρμακα ἐμετικά, *emetica*; from ἐμέω, *vomo*.) Emetics may be defined—substances which cause the ejection of the contents of the stomach by the mouth, independently of the stimulus of quantity, or of the influence of any nauseous taste or flavour. When these substances, with a few exceptions, are taken into the stomach in certain quantities, they do not immediately operate, but produce an uneasy sensation attended with nausea, which increases, and terminates in vomiting. Even before vomiting commences, the influence of the emetic substance is not confined to the stomach. As soon as the nausea is felt, the countenance becomes pale; and the pulse, diminished in strength and frequency, is quick and irregular. There is occasionally great anxiety, listlessness, and depression of spirits, with a tendency to fainting: at length sweat breaks forth, and just before vomiting commences, a peculiar sensation is experienced at the clavicles. After the vomiting has begun, the face flushes, the pulse is quickened, and it remains so betwixt each effort of vomiting, which occurs several times in succession, at short intervals, before it ceases. The nausea now subsides, either at once or by degrees, leaving a transitory feeling of depression, which makes the patient indifferent to every thing around him.

When emetic substances, with the few exceptions to which we have already alluded, are received into the stomach, they do not operate by any local stimulating influence on the coats of that organ; the time which elapses after they are swallowed sets aside such an opinion; and there exist other sufficient reasons for affirming that they are absorbed and carried into the circulation before vomiting is induced. When a solution of tartar emetic is injected into the jugular vein, it produces vomiting

sooner than if it had been swallowed; and an experiment of M. Majendie has demonstrated that vomiting produced by an emetic substance may be stopped by pressure made upon the medulla oblongata. Now the inference that may be drawn from this fact is, that the action of emetics is not owing to any local stimulus on the nerves of the stomach, but to the action of the emetic substance, after being absorbed into the circulation, as a direct stimulus to the origin of the nerves, whereby contractions of the stomach, and the actions of the other muscles concerned in the act of vomiting, are induced. These nerves comprehend a branch of the eighth pair, the intercostal, and the phrenic nerves.

It may be inquired—what is the nature of the irritation which excites vomiting? Does it depend on the physical character of the particles of the substance employed? or is it the result of some chemical or electro-chemical change? These are queries which cannot be satisfactorily answered: all that can be said is, that there is, probably, something connected with the substances which cause vomiting, which has the power of irritating a particular set of nerves only: for, were this not the case, why should tartar emetic, when injected into the jugular veins, excite vomiting?

Vomiting may be produced by a variety of causes, either connected directly with the stomach itself, or indirectly, by sympathy with it through the medium of the nervous system.

1. Vomiting may be directly induced by food undergoing changes inconsistent with healthy digestion; by mechanical irritants lodging in the stomach; by tumours pressing on the pylorus; by inverted actions of the intestinal canal, forcing the contents of the duodenum, particularly the bile discharged into it from the biliary duct, into the stomach; by chemical acids and other poisons, or emetic

substances taken into it; by any the mildest substances, when inflammation of its coats, or ulceration, augments its nervous irritability.

2. Vomiting may be indirectly induced by strangulations of the intestinal canal; by the irritation arising from biliary or renal calculi impacted in the excretory ducts of the liver or of the kidneys; by titillation of the fauces; by inflammation of certain portions of the contents of the cranium, for example, of the arachnoid membrane covering the base of the brain; by repelled cutaneous eruptions; by emetic substances injected into the veins; by sailing, swinging, riding in a carriage, and other movements of the body; by pregnancy; by the influence of certain odours; and by mental impressions. Whichever of these causes produces vomiting, a specific action of the stomach, and the consent of certain muscles of the thorax and the abdomen are, in every instance, necessary to produce the effect; thence the question, in what manner is vomiting effected? In replying to this query, let us first inquire what opinions have been advanced regarding it by others.

M. Chirac* first suggested the opinion that the stomach is passive during vomiting, which he contends is effected solely by the action of the diaphragm and the abdominal muscles; an opinion afterwards adopted by Duverney, Bayle, and John Hunter. M. Litre denied the influence of the abdominal muscles, and maintained that the diaphragm is the chief agent in producing vomiting. Lieutaud and Haller supported the idea that the stomach is the real agent; the former founding his opinion on having observed, in a patient who could not be made to vomit by the most powerful emetics, that the stomach was greatly distended and insensible. Sir Charles Bell† appears to hold nearly similar opinions to those of Lieutaud upon this subject. "That vomiting," says he, "may be produced by the inverted motion of the stomach and diaphragm alone, is apparent from experiments upon living animals, where the abdominal muscles are laid open, and from cases in which the stomach has rested in the thorax, and yet been excited to active vomiting." He also states that the walls of a stomach in his possession "had become so thick that they could no longer suffer contraction by the muscular fibres; the consequence of which was, that although the inner coat of the stomach was in a raw and ulcerated state, there was no vomiting." Sir Charles, however, modifies this opinion by remarking, "that when the stomach is excited to vomiting, there is consent of the abdominal muscles, by which they are brought into violent spasmodic action; not alternating in their action, as in the motion of respiration, but acting synchronously, so as greatly to assist in compressing the stomach; but," he adds, "at the same time, the action of these muscles, however forcible their contraction, cannot alone cause vomiting; nor has this action any tendency to produce such an

effect on other occasions, in which the utmost contraction of the diaphragm and abdominal muscles is required to the compression of the viscera."

M. Majendie, in an able memoir published in 1813, supports the opinion of Chirac.* In one of his experiments, he drew the stomach through an opening of the abdomen, thus freeing it from the influence of the diaphragm and abdominal muscles, and he found that vomiting could not be excited. He also ascertained that, if all the abdominal muscles be removed, leaving only the linea alba, vomiting still occurs from the stomach being pressed, as he supposes, between that part and the diaphragm. In another experiment he states that he substituted a pig's bladder for the stomach, and, nevertheless, vomiting took place! He found that the division of the phrenic nerve weakens the action of vomiting, but does not altogether prevent it.

These experiments prove—1. that the influence of the nervous system is essential to the production of vomiting; 2. that the abdominal muscles greatly influence the ejection of the contents of the stomach. But they do not satisfactorily explain the action of the diaphragm, nor the part which the œsophagus bears in the operation of vomiting. Dr. Richard Harrison, in his Gultonian Lecture, adopts the opinions of Chirac and Majendie, as far as regards the action of the diaphragm and the abdominal muscles; but he adds to this call upon the expiratory muscles through the agency of the brain, and their consequent action, the contraction of the stomach itself. There can be no doubt of the agency of the nervous system in this operation; the only question is, whether the excitement be first exerted on the extremities of the nerves of the stomach itself, from which the impression is communicated to the brain by sympathy, and the auxiliary muscles be thus called into action: or whether, as the writer of this article imagines to be the case, the impression is made upon the spinal marrow from the absorption of the emetic substances, and through the influence of the motor nerves to the respiratory muscles, so that all the machinery concerned in the operation is excited into simultaneous action.

Dr. Marshall Hall has endeavoured to prove that Majendie's assertions respecting the influence of the diaphragm are incorrect, and that the act of vomiting is in fact a forcible expiratory effort. He contends that, if the diaphragm contracted, as Majendie affirms, the act of vomiting would be attended by inspiration; that the glottis, in such a case, would necessarily be open, and that the fluids ejected from the stomach would be drawn into the larynx, and induce great irritation there; an event which does not occur in vomiting. On the contrary, as M. Majendie admits, although he contends for the agency of the diaphragm, the larynx is accurately closed at the instant that the vomited matter is passing through the pharynx. Dr. Hall's explanation of the mechanism

* Histoire de l'Académie des Sciences, 1686.

† Anatomy of the Human Body, vol. iv. p. 54.

* See also Précis Élémentaire de Physiologie vol. ii. p. 140.

of vomiting is this: "the contents of the thorax and abdomen are subjected to sudden and almost spasmodic contraction of all the muscles of expiration, the larynx being closed so that no air can escape from the chest, and the two cavities being made one by the floating or inert condition of the diaphragm." The mere mechanism of vomiting, therefore, according to Dr. Hall, "differs little from that of coughing, by which indeed the contents of the stomach are frequently expelled: the larynx in the former is, however, permanently, in the latter, only momentarily closed; and there is doubtless a different condition of the cardiac orifice and of the œsophagus." In order to confirm his opinion, Dr. Hall made an opening into the trachea of a dog, which was excited to vomit by subsulphate of mercury; during the act of vomiting, the air from the lungs was forcibly driven through the artificial opening. Dr. Hall, in his explanation, admits the influence of the œsophagus, and adds, "it is plain that the cardiac orifice must be freely opened; for mere pressure upon the viscera of the abdomen will not, in ordinary circumstances, evacuate the contents of the stomach. To effect this open state of the cardiac orifice, it is probably necessary that the diaphragm should, indeed, be in a relaxed rather than in a contracted state." There is much ingenuity and considerable truth in this theory; but it does not wholly explain the operation of vomiting. The following opinion of the author of this article may be regarded as a modification of that of Dr. Hall.

He admits that it is true the glottis is closed, and that a powerful effort is made as if of expiration; but this effort is not altogether that of expiration; for, whilst there is a powerful and sudden contraction of the abdominal muscles, forcing up the whole contents of the abdomen towards the thorax, the diaphragm is fixed, owing to the closing of the larynx, and the retention of the quantity of air which the lungs contained at the commencement of the effort. The diaphragm is thus prevented from ascending into the chest; and the pharynx being drawn up as in the act of deglutition, opens the cardiac orifice of the stomach, and forms with this viscus one continuous cavity. This open state of the cardiac orifice of the stomach, forming one continuous cavity of the stomach and pharynx, explains an observation of M. Majendie, that "during the state of nausea which preceded vomiting, in some of his experiments, air was drawn into the stomach." Now, if it be true that the cardiac orifice of the stomach is open, and the mouth, the œsophagus, and the stomach be one continuous cavity, it is evident that the external air, which is heavier than the air and vapour contained in the stomach, will necessarily be forced into this organ by its mere gravity, as it would be into an ordinary receiver containing vapour and little or no air. In this state, by the sudden compression of the stomach by the abdominal muscles drawn forcibly and suddenly inwards, the diaphragm being fixed, the contents of the stomach must be directed up-

wards, with a degree of force commensurate to the suddenness of the pressure upon its walls; and consequently they are thus ejected by the mouth. If this description be correct, it is evident that the act of vomiting is the result of the simultaneous action of all the muscles of respiration, at a moment when the glottis is shut, and offers resistance to the ascent of the diaphragm. Dr. M. Hall is correct in describing it as an expiratory effort; but this effort alone would not effect vomiting, were there not the resistance which has been described opposed to it. The stomach, therefore, is in every respect passive; and it is not obvious that contraction of that organ forms any part of the process of vomiting; it is rather in a state of relaxation than of contraction. Thus, if a bag half filled with fluid, with an open tube rising from it, were suddenly struck or compressed, the fluid would be ejected through the tube; but, if at the same time, the bag was also contracting its general capacity, the impulse of the compressing force would be necessarily diminished, and the impetus of the ejection of the fluid considerably weakened.

Such is the view of this operation taken by the writer of this article; but in whatever manner it is accomplished, there can be only one opinion respecting the share which the nervous system has in the operation. "This act, (vomiting,) will not take place," justly remarks Dr. Paris, "however forcibly the stomach may be goaded by emetics, where the energy of the nervous system is suspended, as in cases of profound intoxication, or in violent wounds and contusions of the head; while, if the brain be only partially influenced, as by incipient intoxication, or by a less violent blow upon the head, its irritability is increased instead of being paralysed, and vomiting under such circumstances is excited by the slightest causes."*

The first effect of the influence of an emetic on the system is the production of nausea, and a consequent diminution of general excitement: this is followed by the ejection of the contents of the stomach, and an alteration in the condition of its secreted fluids: thus, for example, in dyspepsia not only do emetics eject any superabundant acid contained in the stomach; but they also so influence the functions of the secreting follicles, that for some time all acid totally disappears. Along with the contents of the stomach, bile is also generally ejected, owing to the compression of the liver and the gall-bladder forcing a large quantity of this secreted fluid into the duodenum and the stomach. In the act of vomiting, also, all the abdominal viscera being compressed, the blood is propelled more forcibly through their vessels; thence a change is effected on the intestinal secretions, and on those of the pancreas and the spleen: even the kidneys are affected, and the quantity of urine is considerably increased. The pulmonary system is also influenced, a freer circulation of the blood through the lungs is promoted, and the action of the secreting and exhalant vessels is augmented. But, besides these effects of

* Pharmacologia.

emetics on the particular organs, the result of their influence on the general system is the equable distribution of the blood to every part of the body; and the consequent removal of local determinations and congestions. How far these effects depend in part upon the absorption of the emetic substance is yet to be ascertained.

Emetics operate as evacuates in other respects than by emptying the stomach; they induce diaphoresis, and by stimulating the capillary system, and thereby checking the effusion of serous fluids into the cavities of the body, enable the absorbents to carry off any fluid already accumulated there: thence their utility in dropsical affections. By the nausea, also, which attends their operation, abating the force of the circulation, they have sometimes proved useful in active hemorrhages.

Although all the substances classed as emetics accord in producing more or less nausea and vomiting, yet they differ in some circumstances.

1. *Emetics differ in the time required for producing their effects.*—The sulphates of zinc and of copper operate the quickest of all the emetic substances in common use, exciting vomiting almost as soon as they are swallowed. Tartar emetic, and the other active antimonial preparations, and subsulphate of mercury, operate quickly also, but less so than the salts of zinc and of copper; whilst all the vegetable emetics are still more tardy in producing vomiting. This diversity in point of time has not been satisfactorily explained: it has been supposed to depend on the solubility of the emetic substance in the gastric juice, and its consequent application to the extremities of the nerves of the stomach being thus more or less facilitated. But, independently of the fact that all emetics, with the exception of the few which operate by their direct influence on the nerves of the stomach, are absorbed before they produce their effects, there is no evidence of this action of the gastric juice; and substances already in a state of solution are influenced by the circumstances, whatever these may be, which produce this diversity. Two substances held in solution in the same solvent, and conveyed into the stomach under the same circumstances, differ considerably in the time which elapses before they operate. Thus a solution of tartar-emetic in wine operates sooner than a vinous solution of ipecacuanha; although, were both these substances in the solid state, and were the action of the gastric juice on them requisite for their operation, it is probable that the vegetable substance would be the most readily dissolved, and consequently operate most quickly; but the reverse is the case. It is probable that the diversity depends on the more rapid absorption of the antimonial salt than that of the emetina, the active principle of the ipecacuanha, after both have passed the pylorus. The time required for the operation of different emetics should be familiar to the physician, as much of the benefit to be expected from this order of remedies sometimes depends upon this circumstance.

2. *Emetics differ in the degree and the severity of their effects.*—The saline emetics in general operate more violently than the vegetable emetics; but the latter cause a more severe and longer continued nausea. It is not easy to account for these effects, unless we admit that, although the first impression of the saline emetic on the nervous system be the most energetic, yet, that the saline substance is more readily decomposed, or thrown out of the system, than the vegetable.

It is of much importance, in a practical point of view, to attend to the degree of energy of operation of different emetics, and to avoid any risk connected with their violent action. Emetics do not operate with much energy on persons of torpid habits; larger doses are required than in ordinary cases; and, not unfrequently, vomiting cannot be excited by any dose. When this is the case, emetics cause great anxiety and uneasiness. Persons of a sanguine habit are more easily affected by emetics than those of a melancholic; women than men; children than adults: thence experience has informed us that, in febrile affections, vomiting is a common symptom in such persons. It is of some importance to know how to anticipate the degree of difficulty or facility with which different persons can be excited to vomit, seeing that not only those who are not easily excited suffer from pain and anxiety, but those who are very easily affected are apt to be injured by even the ordinary dose of an emetic.

Emetics are contra-indicated in some conditions of the system. In all cases in which the phlogistic diathesis prevails, they ought not to be administered until after bloodletting and purging have been employed. They have, nevertheless, been found very beneficial in some inflammatory affections. In croup they are supposed to be specially indicated: Dr. Crawford, and many subsequent writers on that disease, recommend them to be administered in the earliest stage of it; others, however, urge the propriety of waiting until the inflammatory action be at least mitigated by the use of the lancet, calomel, and purgatives. In those cases in which we have seen them employed in the commencement of the disease, much less assistance has been required from bloodletting than when they have not been given. We must admit, however, that when the inflammatory symptoms run high, they are at least of doubtful efficacy. In pneumonic affections, also, if the state of the bronchial cavities require the influence of an emetic to aid expectoration, they ought not to be employed until after the excitement has been reduced by the proper use of the lancet. As pressure is necessarily applied to the descending aorta during the action of vomiting, there is a temporary interruption to the pulmonary circulation, and the blood is returned with difficulty from the head; consequently vomiting should not be excited in states of the habit predisposing to apoplexy. From the compression, also, of the abdominal viscera, the administration of emetics requires caution in those afflicted with hernia and prolapsus of the anus or of the uterus; nor are they always ad-

missible in the advanced stage of pregnancy. The spontaneous vomitings which attend the early stage of pregnancy are sufficient guarantees of their safety at that period. In diseases of debility, and in weak and delicate subjects, emetics, especially those which nauseate, should be carefully avoided. Experience has also proved that the frequent employment of emetics is injurious, producing general debility, and such an irritable state of stomach that it is excited to vomiting by the most trifling causes, even by changes in the nature of the food; indeed no means are so likely to induce dyspepsia as the custom of taking frequent emetics.*

With respect to the period of the administering emetics, much must depend on the circumstances of the case which demand their employment.† If there be no immediate urgency, the evening is the best time; for as the body is always more or less exhausted by the operation of an emetic, the tendency to sleep which supervenes can then be readily indulged. Attention to the period for administering emetics is particularly requisite in febrile affections. Thus when they are necessary in continued fever, the time of day for administering them with most advantage must not be overlooked. In almost every continued fever there is a mid-day and an evening exacerbation. These are not always very obvious; the evening one, however, is the most so; and its approach is marked by increase of pulse, thirst, headach and dry hot skin. It is immediately prior to this accession that emetics will be found most useful, sometimes checking it altogether, at other times at least diminishing its violence.

In reference to the operation of emetics, we may remark that the dose of the emetic substance should be sufficient to produce full vomiting, otherwise nausea and restlessness, instead of vomiting, will follow the administration of the medicine. It is the custom to order warm water to be freely drunk during the operation of an emetic. This certainly promotes its action if the fluid be taken after each time of vomiting; but it is requisite to be cautious that too much is not taken at once. The stomach, when oppressed with water, does not yield to the action of the muscles which are excited to produce vomiting, thence it is in danger

of laceration. There are several instances on record of this having occurred; but it may be questioned whether rupture ever happened, unless the organ was previously diseased? The quantity of fluid for an adult should not exceed two thirds of a pint at a draught; it should be tepid, and, if the stomach be weak, some bitter infusion, as, for instance, that of camomile flowers, or a few drops of liquor ammonia in the water, should be employed to aid the action of the emetic. If the vomiting be severe and long-continued, it may be checked by solutions of neutral salts; sulphate of magnesia for example, or citrate of potassa, formed with the carbonate of potassa and *fresh* lemon-juice, given in a state of effervescence; or a teaspoonful of magnesia may be given in a glass of sherry; or solid opium or hydrocyanic acid may be administered in small doses.*

All substances employed to excite vomiting may be arranged in two classes—*direct* and *indirect* emetics.

I. *Direct emetics* are substances which cause vomiting by an immediate impression on the nerves of the stomach. It may be asked how can this take place, if the stomach be a passive agent in the act of vomiting? We reply, that by the term passive agent we do not mean to assert that the stomach is insensible to the stimulus of all emetic substances; on the contrary all irritants, whether chemical or mechanical, are capable of stimulating the stomach to vomiting; but, nevertheless, in this operation, the stomach is not the active agent. This seeming inconsistency may be thus explained. When the stomach is in the performance of its natural function, the digested food is pushed forward to the pyloric orifice; but if the chymification be not complete, it is again thrown back into the fundus, and occasionally into the pharynx, producing eructation; a circumstance, however, which occurs only when the secreted juices of the stomach are in a morbid state; and, under this condition, the ejection resembles in every thing but degree that produced by emetics. In a similar manner, when a large dose of sulphate of zinc, for instance, is swallowed, its immediate application to the nerves of the fundus of the stomach, produces a spasmodic contraction there, which throws the whole contents of the viscus mixed with the sulphate upon the pylorus; but these are as rapidly returned, even before the relaxation which must follow the spasmodic contraction have taken place; and by this means, the emetic substance being applied to the nerves of the cardiac portion of the stomach, the muscles and every other part necessary for effecting vomiting are simultaneously called into operation, and vomiting takes place. This is the opinion of the writer of this article, and he conceives that it is the only theory capable of explaining the imme-

* This remark is, apparently, at variance with the custom of the Romans. Emetics were daily taken to enable them to relish the enjoyments of the table; and so far did the Romans carry this custom that they sometimes excited vomiting to eject from the stomach what they had eaten in one course, that they might be the more capable of enjoying what was to follow. According to Seneca, "they vomited that they might eat, and ate that they might vomit." They employed emetics before meals that they might be able to eat more plentifully; and they often concluded a feast with an emetic to prevent the consequences of gluttony. In one of Cicero's epistles to Atticus, he describes a visit which he made to Cæsar, at his villa near Rome; and states that his dignified host paid him the compliment of taking an emetic before dinner when he understood that Cicero intended to spend the day with him.

† Some of the old writers, Stoll in particular, regard the period of the day as a matter of indifference. Rat. Med. 11.

* Many other means may be employed to check vomiting; as, for instance, the administration of subnitrate of bismuth, infusion of calumba, strong coffee, tincture of capsicum diluted with water, in that induced by pregnancy and sailing;—a large dose of calomel, and dry cupping on the epigastrium.

diate emetic influence of sulphate of zinc, sulphate or acetate of copper, and carbonate of ammonia. These substances, when taken into the stomach, first hasten, in a spasmodic degree, that action of the organ which carries the food forward to the pylorus; and there acting *contra naturam*, instead of opening the pyloric orifice, they are thrown back upon the cardiac portion of the stomach, the nerves of which being suddenly impressed, call into play all those sympathies which operate to produce the action of vomiting. If this theory be admitted, it may be applied to explain not only the vomiting caused by powerful irritants when swallowed, but those also which occur in cancerous affections of the pylorus, and in the early stages of pregnancy. Thus, in cancer of the pylorus, when food is taken into the stomach, no vomiting occurs until it is pushed forward to the pylorus, which, being morbidly excitable, throws back the food mixed with acrid matters the result of the disease, and these acting on the sentient extremities of the eighth pair of nerves spread on the cardiac portion of the stomach, the muscles of the abdomen and those of respiration are instantly called into action to relieve the stomach of the offending matter. In pregnancy, again, the sympathy between the stomach and uterus is such, that the disturbance of the former is in the direct ratio of the energy of the latter; digestion, therefore, becomes depraved, the chyme is imperfectly formed, and, mixed with the acrid secretion, is thrown back from the pylorus, and applied to the cardiac nerves, and vomiting is necessarily excited.

Substances which act in the manner just described are those which constitute *direct emetics*. Their operation is preceded by no nausea, neither is any left behind after it is completed. Emetics of this division, therefore, are adapted for producing full and immediate vomiting, in those conditions of the habit in which the exhaustion caused by nausea would be injurious, but in which it is nevertheless necessary to unload the stomach. They are also the most useful in cases of poisoning, not only on account of the rapidity of their operation, but from their action not being followed by absorption, which, in such instances, would prove highly prejudicial. Direct emetics are few in number, and are all inorganic substances.

1. *Ammonia*. If the official solution of ammonia, to the extent of half a fluid drachm, be swallowed in a cupful of cold water, and the same quantity of tepid water be taken immediately afterwards, it excites instant vomiting. But as untoward circumstances have occasionally followed the administration of the solution of pure ammonia, it is rarely employed as an emetic; the carbonate, in doses of from 3℥ to 3i being given in its stead. It has been found serviceable in those cases of chronic catarrh, in greatly debilitated habits, in which expectorants cannot with propriety be administered. In such a state of the system, the act of vomiting, induced by the ammonia, aids in unloading the bronchial tubes, whilst, at the same time, a salutary stimulus is given to the nervous system; and the expectoration, which in

general is suspended in such cases, is again brought on. When administered in larger doses, ammonia operates as an irritant poison, and requires the immediate administration of vinegar to neutralize and obtund its acrimony. (See TOXICOLOGY.)

2. *Sulphate of zinc*. This is a more safe direct emetic than ammonia, and equally powerful in its effects. It excites no nausea, and operates as soon as it enters the stomach, producing a single but copious ejection: it is, therefore, well adapted for cases of poisoning, and to excite vomiting in the commencement of the paroxysm of ague, when we are desirous of breaking the morbid association which keeps up the disease, by giving such an impulse to the system as will propel the blood to the surface, and equalize the circulation. In cynanche tonsillaris, when abscess forms in a situation which cannot be readily reached by the knife, and yet does not seem disposed to break, as the object of prescribing an emetic is merely to burst the abscess, the sulphate of zinc is to be preferred to any other substance. The dose of the sulphate to produce full vomiting is from ʒi to 3℥. If an overdose have been taken, the best antidotes are cretaceous mixtures, milk, and albumen, after the use of the stomach pump.

3. *Salts of copper*. Both sulphate and acetate of copper operate as powerful direct emetics. They have been employed in the incipient stage of phthisis; and it is a curious fact that in this disease the sulphate will sometimes lie in the stomach for upwards of half an hour without producing vomiting, and then operate at once, and as forcibly as when it acts in the usual manner. We may be here permitted to remark that emetics have been regarded as specifics, and have been prescribed in every stage of this disease. "It is remarkable," says Dr. Young, "that a very great majority of the cures of consumption, which are related by different authors, have either been performed by emetics or by decidedly nauseating remedies."* They were employed in this disease by Hippocrates, whose emetic was a compound of honey, vinegar, and water;† and by Galen, who followed the example set by the father of physic. Bennett, Morton, Etmuller, Wainwright, Russell, Bryan Robinson, Marryat, Donald Monro, Macbride, and many other equally distinguished physicians speak also favourably of their effects. The confidence of Dr. Reid and Dr. Simmons in the use of emetics in phthisis was unbounded. Dr. Mackittrick Adair held almost as sanguine an opinion of their beneficial influence as Dr. Reid: he gave first a pint of warm water, then a grain of sulphate of copper with a drop of dilute sulphuric acid in half an ounce of water every other evening for three days; then every morning.‡ Notwithstanding these strong testimonies, truth obliges us to state that the method of treating phthisis with emetics has not suc-

* Young's Practical and Historical Treatise of Consumptive Diseases, &c. p. 65.

† Hippocrates on Int. Aff.

‡ Duncan's Commentaries, 1791; p. 473.

ceeded in our hands, nor in those of many of the most distinguished men who, at different periods, have adorned the profession. If emetics, however, be employed, those which operate directly, the sulphates of zinc and of copper, should be preferred. The dose of the sulphate of copper is from ten to fifteen grains dissolved in three ounces of water. In cases where it has been overdosed, the best antidotes, after the use of the stomach-pump, are ferrocyanate of potassa, milk and albumen.

II. *Indirect emetics* are obtained both from the organic and inorganic kingdoms of nature. Indeed, whatever disturbs the energy of the brain to a degree sufficient to affect the stomach by nervous sympathy, and to call into action the muscles necessary to establish the act of vomiting, may be regarded as an indirect emetic. Thus the mechanical irritation of the uvula and velum of the palate with a feather or with the finger; the motion of a carriage, swinging, whirling, sailing, and many narcotics, produce nausea and vomiting; and the same effects result from inhaling some gases.

Among the organic substances which operate as indirect emetics are some varieties of acrid oil, in combination with resin and other principles, as found in the cotyledons of *sinapis nigra*, the flowers of *anthemis nobilis*, and the leaves of *asarum Europæum*.

1. *Mustard*. A table-spoonful of flour of mustard mixed in water forms a ready and useful emetic, in cases which admit of stimulants: it operates quickly, and with less nausea than the direct emetics. This dose is rather large if the flour of mustard be genuine; but that usually sold in the shops contains, according to Dr. Paris, one sixth part only of genuine mustard. Emetics of flour of mustard are useful in cases of intoxication threatening apoplexy, as the stimulant property of the mustard proves beneficial after its emetic operation is over. In the atonic form of gout, also, in which no irritation is more hurtful than that arising from crude undigested matters in the stomach, a mustard emetic may prove highly beneficial, or at least the substance employed to excite vomiting, in such a case, should be of a warm stimulant kind, the operation of which is not followed by debility. For the same reason, no emetic is so well suited for cases of malignant cholera as mustard.

2. *Camomile flowers*. A strong tepid infusion of these flowers is powerfully emetic, when administered in doses of from $f\text{ʒ}iii$ to $f\text{ʒ}iv$; and a weaker infusion is well adapted for promoting the action of other emetics, when the stomach is weak and likely to be oppressed by the use of tepid water.

3. *Asarabaca*. This plant owes its emetic property to a combination of acrid oil and cytissina.*

* This peculiar principle received its name from having been first obtained from the seeds of the cytissus *laburnum* by MM. Chevallier and Lasaigne. In a separate state it is of a yellow colour, has a nauseous bitter taste, attracts moisture from the air, dissolves readily in water, less so in alcohol, and is totally insoluble in ether. It is better known from its negative than its positive qualities, as none

It is very seldom employed, as it loses much of its emetic power by drying and keeping.

4. *Emetina*. A more common indirect emetic than either of the three substances already mentioned is *emetina*, as contained in the roots of *ipecacuanha*, (*cephaelis ipecacuanha*.*) This principle operates more quickly as an emetic than the root which yields it, and its action is followed by sweating and a tendency to sleep. It has not been much employed in this country, but the French physicians prefer it to *ipecacuanha*. It is ordered in a solution of four or five grains in six fluid ounces of water, of which two fluid ounces are ordered to be taken every half hour until full vomiting is procured. That it operates on the nerves through the medium of absorption has been demonstrated by injecting a minute portion of it into the jugular veins, the cavity of the pleura, the tissue of the muscles, and the anus of a dog; in all of which modes of applying it, vomiting is produced. If it be overdosed, dangerous, sometimes fatal effects ensue: when the latter occur, it excites inflammation of the mucous membrane of the alimentary canal, and the lungs are found gorged with blood, and approaching to hepatization. The best antidote is infusion of galls, which, by forming an insoluble precipitate with the *emetina*, neutralizes and renders it inert.

5. *Ipecacuanha root*, *radix cephaelis ipecacuanha*, which owes its emetic properties to the principle just described, has been known in Europe as an emetic since the middle of the seventeenth century.† It is administered in the form of powder, infusion in water, and solution in wine. The powder is the cortical part of the root, the central or ligneous part being inert: it should be of a bright grey colour, have a nauseating disagreeable odour, and a bitter acrid taste which remains in the throat.‡

of the re-agents which usually precipitate bitter vegetable infusions make the least change in it; nor does it display either acid or alkaline properties.

* *Emetina* is procured from *ipecacuanha* by treating the powdered root with cold distilled water until it ceases to take up any more soluble matter. This watery infusion is then to be concentrated by evaporation in a water-bath; subcarbonate of magnesia added to it in excess, and the evaporation continued to dryness; after which it is to be treated with strong alcohol, and the extract thus procured again treated with water, and evaporated to dryness. In its pure state *emetina* is white, pulverulent, unalterable in the air, scarcely soluble in cold water, soluble in hot water and in alcohol, but not in ether. Its taste is slightly bitter, and it displays alkaline properties. It is usually, however, procured in the form of brown scales, semitransparent, with an odour resembling caromel, and a bitter slightly acrid taste. It is a compound of carbon, hydrogen, oxygen, and nitrogen. Gallic acid, and infusion or tincture of galls precipitate from its solutions in an insoluble form; and it is also thrown down by tincture of iodine, subacetate of lead, bichloride of mercury, and muriate of tin. When it is separated from the *ipecacuanha*, what remains is inert. It was discovered by M. Pelletier in 1817.

† The name of the root is a compound of two Peruvian words, *ipe* signifying root, and *Cuanha* the name of the place where it was first found.

‡ Owing to a peculiar idiosyncrasy, some persons are affected with severe dyspnoea by the odour of *ipecacuanha*. (See ASTHMA.)

In doses of from \mathfrak{z} i to $3\mathfrak{z}$ it produces full vomiting. If $3\mathfrak{z}$ of the powder be triturated with \mathfrak{f} vi of water, and \mathfrak{f} ziii of the solution administered at the distance of half an hour, full vomiting generally follows the second dose. The vinous infusion is chiefly ordered for children in doses of \mathfrak{f} ziii, repeated every fifteen minutes until vomiting be produced.

When ipecacuanha in any form is taken into the stomach, its first effect is on the mucous membrane as a local irritant: it is, however, partially digested in the stomach, and the emetina thus separated is absorbed and produces that simultaneous action of the muscles of the abdomen, the thorax, and the diaphragm, which constitutes vomiting. But, sometimes, in the largest doses, it fails to produce this effect; a circumstance which, if the drug be genuine, can only be attributed to idiosyncrasy. In administering ipecacuanha, or its active principle, as an emetic, it may be given with the intention of either simply unloading the stomach, or of acting sympathetically on more distant organs after it has performed its emetic effect. When prescribed with the first intention, it frequently operates also on the bowels, owing to some of it being forced beyond the pylorus in the first effort of vomiting; and on this account, when added to jalap, the purgative properties of this drug are much augmented. When it is desirable to extend its action after vomiting, this part of its operation should be less aided with tepid water than when vomiting only is required; the result is a powerful determination to the surface and copious perspiration, from the continuation of nausea after its emetic effect has ceased. The question has frequently been discussed, whether ipecacuanha and tartar-emetic may be indifferently employed as an emetic? The answer is not difficult. In choosing between these emetic substances, we must be guided by the condition of the system, and the nature of the disease, as well as the intention for which the emetic is prescribed. In intermittents, if the frame of the patient be delicate, ipecacuanha is to be preferred; if it be robust, capable of bearing full vomiting with impunity, and without suffering from the subsequent debilitating effects of profuse sweating, the antimonial preparations will be found most useful. In continued fever, in selecting an emetic we must not only prefer that which will produce full vomiting, but which will excite also that state of the surface which may act as a crisis; consequently, the tartrate of antimony and potassa is preferable to ipecacuanha. The influence of nausea in checking hemorrhages has been well established; but the superiority of ipecacuanha over all other emetics in those connected with the uterus, has only lately been established by the experiments of M. Caffin,* and Dr. Osborne, of Dublin.† The latter found that in doses of a scruple taken in the evening, and followed by an acidulated saline purgative next morning, the

discharge in menorrhagia ceased in twenty-four hours; and when it returned after a short interval, the repetition, once or twice, of the ipecacuanha emetic never failed to render the cure permanent. Dr. Osborne's experiments were conducted in Sir P. Dun's Hospital: in several of the numerous cases treated in this manner, the ipecacuanha arrested the discharge after tartar-emetic had produced no beneficial effect: and its influence was not modified either by a full pulse, with much excitement, or in a greatly weakened state of the system. In dysentery the superiority of ipecacuanha, when full vomiting is required, was determined by a set of experiments made by Sir George Baker.* Finally, ipecacuanha is preferable in every instance in which the powers of the stomach require to be maintained, and yet vomiting is requisite; and in cases in which a chronic diarrhoea exists, there can be one opinion only as to its superiority over tartar-emetic.

Although the usual dose of ipecacuanha is from \mathfrak{z} i to $3\mathfrak{z}$, to promote full vomiting, yet this must vary considerably in reference to sex and temperament. The dose for a young infant is gr. i; for a child of from six to ten years of age grs. x; and for the youth of either sex under twenty from gr. xiv to \mathfrak{z} i.

With respect to the propriety of substituting emetina for ipecacuanha, some advantages might result from doing so; its effects, as an emetic for instance, are more certain, and its use is generally followed by sweating and a tendency to sleep. The dose of the emetina is small, not exceeding gr. v for an adult; and as it is very soluble in water, it can be more readily administered in divided doses than ipecacuanha. Besides, the powder of ipecacuanha loses much of its activity when kept for many months, whereas emetina is not at all altered by keeping.

6. *Squill, scilla maritima*.—The bulb of the squill, when properly dried, possesses considerable emetic powers, which are said to be attributed to a peculiar principle named *scillitina*;† but this is a compound substance, containing, besides the active principle of the squill, sugar, and traces of citrate of lime. Ether, when digested on squill, and evaporated afterwards on water, leaves on the surface a thin pellicle, intensely bitter, whilst a soluble matter mingles with the water: this pellicle is the real active principle of squill. Squill is seldom employed as an emetic; but in cases where its emetic influence is no objection and does not interfere with its expectorant powers, as in whooping-cough, croup, and some other pulmonary diseases, it is found useful. When

* Trans. of the Royal College of Physicians of London, vol. ii.

† Scillitina was first obtained from the squill by Vogel. When pure, it is colourless, intensely bitter, with some sweetness, friable, and resembles a resin in its appearance and fracture, and is equally soluble in water, alcohol, and vinegar. It is deliquescent, gives viscosity to water; but differs from gum in not affording mucic acid when it is treated with nitric acid.

* Journal Général de Médecine, vol. lxi.

† Observ. on the Employment of ipecac. in Menorrhagia.

emetics are thought to be serviceable in ascites and anasarca, squill has been supposed to be particularly indicated, but it is in no respect superior to tartar emetic in such cases. It is given in the form of powder, in doses of from grs. iii to gr. xii; or in that of tincture, from *m. xxx* to *f. ℥i*, repeated at intervals. When overdosed it operates as a narcotico-acrid poison, causing violent vomitings, diarrhoea, tormina, bloody urine, tetanus, and a cuticular eruption resembling urticaria: in some habits these effects result even after a small dose of the medicine.

7. *Tobacco*, *folia nicotianæ tabaci*, displays powerful emetic properties, whether it be taken into the stomach, inserted into the rectum, or applied to the surface of the body; but its operation is too difficult to controul to permit it to be prescribed, under any circumstances, as an emetic. It is mentioned merely because it has lately been recommended as a remedy in dropsy. In the event of its use producing poisonous effects, it is proper to know that infusion or tincture of galls renders the infusion of tobacco inert, and consequently should be instantly administered.

Inorganic emetics.—The first of these necessary to be noticed, is the *tartrate of antimony and potassa*, a salt which has been employed as an emetic since 1631.* As an emetic, it operates through the medium of the nerves, and probably never until it reaches the circulation. It proves emetic, or purgative, or sudorific, according to the frequency of the dose: thus a grain, dissolved in a moderate quantity of water, given every ten or fifteen minutes, produces full vomiting; the same quantity repeated every three hours may vomit once, but it afterwards purges; and if administered once in six hours only, it causes copious diaphoresis. It is the best of the emetic substances for producing full vomiting at the commencement of continued fevers, and in all cases where it is of advantage to keep up a state of nausea. In mania it is preferable to all other emetics; but it requires to be prescribed in much larger doses than in most other diseases, a scruple often producing little effect whilst the state of congestion of the brain remains; but, if the lancet have been previously resorted to, a grain or two grains will produce full vomiting. In melancholia the direct emetics are to be preferred, as the nausea which follows the use of tartar emetic is in this instance injurious, by augmenting the collapse which always occurs in this disease.

When overdosed, besides operating as a powerful emetic, tartar emetic produces poisonous effects on the mucous coat of the alimentary canal. The best antidotes are infusions of yellow cinchona bark, galls, catechu, or any of the astringent vegetables, the tannin of which unites with the oxide of antimony, and forms an insoluble inert salt. But it is not

easy to determine what is an overdose of this salt in disease. The custom of prescribing it in large doses has lately been revived by Rasori and other Italians, and their example has been much followed by all the continental physicians. Laennec states that he gave it to the extent of forty-eight grains, in divided doses, in twenty-four hours, without any deleterious effect, and even without exciting vomiting, except on the first day. Dr. Christie, in a treatise on the nature and treatment of cholera, asserts that he has given ℥i at once, with the effect only of producing some vomiting and a few watery stools. The writer of this article, who has frequently prescribed it in doses of grs. iii, repeated every third hour, has observed that it seldom causes vomiting after the second or third dose. Rasori explains the power of sustaining such large doses, on the principle that a peculiar diathesis accompanies diseases of excitement, in which only such doses can be borne; and that it ceases as recovery takes place. Laennec, however, says that this power of endurance does not cease at the close of the fever, although it is diminished; a circumstance which, if the observation be correct, may be ascribed to the force of habit.

When tartar emetic proves poisonous, the symptoms resemble those of cholera; violent vomiting, diarrhoea, great pain and tension of the abdomen, and delirium; convulsions supervene, and death sometimes results. These symptoms have sometimes followed the administration of moderate doses. On examination of the body after death, the only marks of previous excitement are slight congestion in the brain, and a thickened state of the villous coat of the stomach and the duodenum, which is covered with a tough mucus.

Tartar emetic is administered in substance, in solution in water, and in solution in wine. The latter preparation is an objectionable one; the free tartaric acid of the wine converting the potassa into a bitartrate, and thus decomposing the triple salt; and the solution should always be made at the time it is to be taken. The solution in wine is chiefly employed in the diseases of children. Some practitioners still adhere to the opinion of Sydenham, who reprobates the use of antimonial emetics for children under eight years of age; but we have never seen any disadvantage follow their administration to children of two or three years of age; nor even, when judiciously employed, to infants at the breast.

(A. T. Thomson.)

EMMENAGOGUES, (from *ἐμμήναι*, the menses, and *ἀγὰ*, to induce,) are medicines which promote the menstrual discharge. It has been doubted whether any medicines operate directly upon the uterus; the decided influence of some in promoting its periodical discharge being referred to the diseased organ sharing in the salutary effect of such medicines on the general system. To determine fairly the correctness of this opinion, we must take into consideration the nature of the organ and its function in the unimpregnated state.

* It was discovered prior to the above date, but was first made known by Adrian Mynsicht, in his treatise entitled, *Thesaurus Medico-Chemicus*.

The texture of the uterus is fibrous, dense, compact, and abounding in bloodvessels; the veins are destitute of valves: it is also well supplied with nerves, and with lymphatics on its external surface. Internally it is lined with a soft, delicate, spongy membrane, composed chiefly of capillary vessels. Such is the organ:—what is its function in the unimpregnated state? How far is it adapted to perform the functions of a secreting organ? Is the periodical evacuation derived from it a true secretion, or a mere discharge from vessels oppressed by a local plethora?

In reply to the first query, it is scarcely necessary to say that its function is menstruation; a discharge periodically recurring once a month. The second and third queries involve a matter of controversy; but the prevailing opinion is in favour of the capacity of the uterus to secrete; and, consequently, that the discharge which it exudes is a real secretion. There is nothing in the anatomical structure of the uterus that unfits it for the function of secretion; and were any arguments necessary to refute the notion that menstruation depends on a general plethoric orgasm, it would be only necessary to bring forward the curious facts bearing on this point presented by the Hungarian twin sisters. These two females were united at the lower part of the back, and lived to the age of twenty-two. The same blood flowed in the vessels of each,—for the abdominal vessels were found, after death, united at the loins; yet the uterine function was distinct in both; it differed in its period, and also in the quantity of the discharge. Indeed, in reflecting on the nature of the organ itself, on its resemblance to other glandular organs in the manner in which it is supplied with blood, and on the adaptation of its internal surface to exhalation, we can have little hesitation in admitting that the manner in which the periodical discharge is supplied closely resembles that of a secreted fluid. The uterine arteries are not only exceedingly convoluted, but they are larger and have thinner coats than the veins, in the unimpregnated state: the blood is, therefore, brought into the organ readily and in considerable quantity, whilst it is slowly returned from it,—a state of vessels highly favourable to the secreting function. It is true that, previously to menstruation taking place, there are symptoms indicative of general plethora as well as of local congestion; yet this fact only proves that the discharge is connected with such a state of the system; not that it is caused by this state, nor that the relief which follows is attributable to blood being discharged by the uterine vessels. The admission, also, that there is an increased determination of blood to the organ at the period of menstruation, does not militate against the opinion that the discharge is a secretion; since it is well known that every glandular organ, when excited by its appropriate stimulus, becomes a centre, as it were, to which the blood is directed. Again, if this discharge were merely the effect of a local plethora, it would be blood, which is not the fact; for it

does not coagulate like blood, nor does it contain fibrine. If it be thus evident from reasoning, that menstruation is not the mechanical result of a local congestion, let us examine how far observation supports the fact that it is a secretion.

The uterus, as we have already stated, resembles a gland in its vascular supply; and this resemblance extends to its diseases; an inflammatory state existing in it being often followed by scirrhous and cancer. Like other secreting organs, also, its function is often imperfectly performed, and the secretion, therefore, is liable to vitiation and derangement. In the first efforts of the organ the secretion is usually thin, colourless, defective in quantity, and its recurrence irregular and protracted: when it is suppressed, it cannot be restored by inducing plethora; nor can the flow, when it has commenced, be checked by venesection or any other means of depletion. In making this remark we must not be misunderstood: it is not our intention to assert that inordinate evacuations in other parts of the system do not influence the uterine discharge; on the contrary, we are perfectly aware that preternatural evacuations induced in the other organic systems will suspend the course of the catamenia, on the same principle that increased action of the intestinal system suspends the action of the cutaneous exhalents, and, *vice versa*, sweating checks diarrhoea. Any argument founded on the supposition that the structure of the uterus is not sufficiently glandular for a secreting organ must fall to the ground, when we reflect that the gastric juice is secreted by the stomach, an organ still less glandular than the uterus. We shall only add, that the correctness of the opinion that the catamenia are a secretion, does not depend altogether on circumstances connected with the organ itself; experience having ascertained that this discharge is intimately connected with the state of the ovaries; for when these organs are much diseased, or removed, or altogether absent, no menstruation occurs. It is not necessary to the establishment of the truth of our opinion that we should be able to explain the cause of the periodical return of the catamenia.

If menstruation depend, as we believe it does, on the secretory function of the uterus, it is obvious that in the unimpregnated state it ought always to happen at its regular period when the organ is in a natural or healthy state; and that in order to promote its return, when it is interrupted or suspended, such medicines must be employed as will tend to restore the organ to that precise state or condition on which the exercise of this function depends; and it is to these that the appellation *Emmenagogue* can only be properly applied. They may be such as will act either immediately on the uterus itself, or such as will merely influence that organ as a part of the general system; emmenagogues, therefore, may be arranged under two heads—*direct* and *indirect*. We shall be able to understand the manner in which both operate, and the propriety of employing the one or the other, only by having a clear idea of the

nature of the morbid condition of the organ, and whether the obstruction or interruption of the periodical discharge depend on a diseased state of the uterus itself, or is the effect of the presence of other diseases in the system.

In some instances the suppression of menstruation is a primary affection, "often," as Dr. Denman has justly remarked, "although not universally, succeeded by a certain train of untoward symptoms:" but more frequently it is the result of other diseases; and, therefore, the nature of these, as well as the state of the patient with respect to vigour and constitution of body, must determine the kind of remedial agents to be selected as emmenagogues. Thus when the delay of the regular appearance of the discharge, after it has once appeared, occurs in females with a pale or leucophlegmatic countenance, indicating an atony of the vital powers, stimulant and tonic medicines are required, to give to the vascular system that degree of power which is necessary to maintain the healthy action of the capillaries: on the contrary, when the complexion is florid, when there is much tension of the system, or when the suppression is connected with great irritation of the uterine system, it is easy to understand that menstruation is more likely to be aided by whatever can diminish excitement and sooth and calm irritation than by stimulants. Thence the fact, that very different, nay very opposite remedies are required to remove amenorrhœa, in different instances.

Stimulants, whether corporeal or mental, undoubtedly tend to an early development of the uterine organs, and consequently to the appearance of menstruation sooner than is usual: thus in tropical climates, and in those females who indulge in luxurious and pampered habits, the age of puberty is earlier than in those who inhabit the temperate and frigid zones, and whose habits and passions are better regulated. The continued influence of stimulants is said, also, to prolong menstruation beyond the period of life at which it usually ceases; but this is at least problematical. All emmenagogues are more or less stimulants; and in cases in which a stimulant influence is contra-indicated, they cannot be employed until the excitement be reduced, and can then be only employed under certain restrictions.

When the uterine obstruction or irregularity is accompanied with a *pale* complexion and a languid state of the system, a variety of medicines are prescribed, either with the view of directly influencing the uterus by some specific action, or of invigorating the habit, and thence eventually promoting its secretory function. By the indiscreet use of the former, much injury may be done to the organ itself: on the latter, however judiciously prescribed, we cannot always depend; they may improve greatly the general health, and yet the catamenia may not reappear. It ought also to be well understood that idiosyncrasy, natural conformation, diseased states of the uterus itself, or of the ovaries, often are obstacles effectually opposed to the salutary influence of emmenagogues. As we have already mentioned, it has been

doubted whether there is any medicinal agent which, when taken into the stomach, exerts a direct stimulant influence on the uterus: but if we admit that some substances find their way to particular organs,—for instance, nitre to the kidneys,—there is no reason why such should not be the case with regard to the uterus; experience, however, has not yet demonstrated that this is the case. But a stimulant effect may be propagated from neighbouring parts to the uterine vessels: thence some cathartics, which operate chiefly upon the rectum, influence the uterus.

When the obstruction is accompanied with a florid complexion, and "the colour of the cheeks is the flush of disease, not the glow of health,"* before taking into consideration the uterine function, bleeding and other antiphlogistic means of treatment must be resorted to; and until the general excitement be subdued, the employment of emmenagogues would be injurious. It is also questionable, whether, even after this has been accomplished, any of the substances supposed to act directly on the uterus should be employed; but if they may be administered, they will be most likely to prove beneficial when given immediately after the reduction of the febrile excitement.

The employment of emmenagogues is not confined to cases of simple obstruction or suppression. In some females the pain with which menstruation is accomplished embitters much of life. Some of the substances employed as emmenagogues are supposed directly to lessen uterine irritation; and thence they are closely allied with sedatives and antispasmodics.

I. *Direct* emmenagogues. These may be subdivided into *immediate* and *mediate*.

1. The only immediate emmenagogue is *electricity*. It is well known that when this powerful agent is passed through any part of the body, a painful sensation is felt at the point of communication. Thus, if the knob of a discharging rod, connected with a chain communicating with the outside of a charged Leyden jar, be applied to one side of the pelvis, and the knob of the jar itself be applied to the side, a feeling will be instantly produced, as if a small sword was thrust through the part, and a stimulant impulse is given to the uterus, by the direct passage of the electrical fluid through it. The stimulant influence of a shock thus communicated, is obvious by the sensation which it excites; but it equally takes place, though in less degree, when no sensation is produced, as when a continued current of the fluid is passed through the organ, by making it a part of a circuit communicating with the prime conductor of an electrical machine. The direct application of electricity is admissible only when a torpor of the uterus exists, indicated by a suppression of the catamenia with a pale complexion and a languid state of the circulation. But even in this state of the habit and the organ, it must be remembered that, whilst applied in moderation, this agent rouses the activity of torpid

* Denman.

parts, in large quantity it injures materially, if it do not destroy altogether the excitability of this organ. In employing electricity, therefore, as an emmenagogue, it should be first used under the form of accumulated electricity, or the bath as it is termed, then the aura, and, lastly, shocks should be given. At first, the shock should be moderate; as, in nervous habits, syncope has followed the unguarded communication of powerful shocks; but with ordinary caution in its application, electricity has been found a powerful agent in amenorrhœa depending either on general debility of the system or atony of the uterus itself. (See ELECTRICITY.)

The influence of ergot of rye, *secale cornutum*, on the impregnated uterus, at the period of parturition, has led to the belief that it may be employed as a direct emmenagogue. Admitting that ergot acts directly upon the uterus, it cannot be denied that its influence in parturition is opposed to that which is requisite for exciting the uterine discharge. If menstruation be a secretory action, a certain supply of blood is requisite for its performance; but ergot acting on the motor nerves, and causing muscular contraction, would necessarily lessen this supply, and produce a state of parts more calculated to impede than to forward the menstrual discharge. Experience has also demonstrated that ergot has indeed very slender pretensions to the character of an emmenagogue.

2. The mediate direct emmenagogues comprehend both organic and inorganic substances. Among the former, madder, the root of the *rubia tinctorum*, has been long employed and relied upon, without any accurate idea of the manner in which it operates; although, from its tinging the urine and the bones of a red colour, it has been supposed that, as it passes into the circulation, it finds its way to the uterus, and directly influences that organ. The late Dr. Barton, an American physician of eminence, placed great reliance on its deobstruent powers; and it was also much esteemed by the late Dr. Home, of Edinburgh, who, in his clinical experiments and histories, has recorded his decided opinion of its efficacy as an emmenagogue. He gave it in doses of from 3ʒ to 3i. twice or three times a day. But notwithstanding these authorities, madder is an equivocal emmenagogue, and is now rarely or never employed.

Savine, the leaves and herbaceous part of the *juniperus sabina*, which owes its stimulant properties to a volatile oil having some affinity to that of turpentine, is an energetic emmenagogue; and from its proneness to produce uterine hemorrhage, and cause abortion, there is some reason for the opinion that the volatile oil is taken into the circulation and acts directly upon the uterus, on which it exerts a stimulant influence. More than a century ago, its tendency to produce abortion led to its employment as an emmenagogue; but from an opinion expressed by Dr. Cullen, it fell into disrepute. In whatever manner it acts, *savine*, or its oil, is well adapted for cases of

amenorrhœa connected with a feeble state of the constitution, and a languid circulation. The dose of the powder is from gr. v. to gr. x.; that of the oil, which can be readily formed into an oleo-saccharum, from m. ii. to m. vi. The extract, ordered by the Dublin Pharmacopœia, is a useless preparation; the volatile oil being dissipated by the heat necessary to be used in forming the extract.

Seneka root, the root of the *polygala senega*, is esteemed a useful and active emmenagogue by the American physicians. The active principle, which is supposed to be a peculiar salt, first noticed by Peschier, and named by him polygaline or polygalina,* resides in the bark of the root. Dr. Hartshorne, of Philadelphia, who first employed it as an emmenagogue, found that it was most useful in recent cases of amenorrhœa. He began its use two weeks previous to the expected appearance of the catamenia, giving it in the form of a saturated decoction, to the extent of a pint in twenty-four hours, pushing the dose as far as the stomach would permit, until the discharge appeared. Dr. Chapman, of Pennsylvania, adds his testimony to that of Dr. Hartshorne in favour of *senega* root, and believes that it exerts a specific action on the uterus; but it ought to be mentioned that the patient is directed to be prepared by an alterative course of calomel, carried to gentle ptyalism; on which account it is difficult to say how much is due to the mercurial, how much to the *senega*. If, however, the observations of the American physicians be correct, *polygala senega* merits the attention of British practitioners as an emmenagogue.

No medicines perhaps merit more the appellation of direct mediate emmenagogues than the preparations of *mercury*. They effect almost a specific change upon the whole glandular system; and, consequently, if the glandular nature of the uterine function be admitted, it is easy to conceive that they are likely to affect the capillaries in the uterus, when these are in an unnatural or morbid condition. The preparation best suited for emmenagogue purposes is calomel; it is mild in its operation, and at the same time certain in its influence on the general system. In the combination in which it exists in Plummer's pill in particular, it has been found highly beneficial, the precipitated sulphuret of antimony greatly aiding its power. In this combination, it may be given in doses of from five to twelve grains every night and morning, until the gums be sensibly affected.

From what has been said, it is obvious that electricity is the only direct emmenagogue, and that the idea of the others acting upon the uterus itself is rather inferred than certain. It is nevertheless true, that, in whatever manner they act, they stimulate the uterus; and, therefore, some caution is requisite to be ob-

* Peschier procured gr. 100 of this salt from ʒvi. of the root. He asserts that it is united with a peculiar acid, which he has called *polygalinic*.

served in their administration. Thus we must be certain that the suppression is not connected with pregnancy; and even, when this is not the case, there is some difficulty in deciding upon the propriety of administering direct and stimulant emmenagogues; the uterus may be in such a state of active disease, as to render their influence upon it extremely hazardous.

II. *Indirect* emmenagogues. The operation of these is effected in three ways:

1. By the substance operating on the kidneys or the intestinal canal, and stimulating the uterus by proximity.

2. By the substance acting on the stomach and improving the general health, so that the uterus shares the general salutary influence.

3. The uterus may be specifically acted upon through the medium of the nervous system.

The substances that operate in the first manner are, some diuretics, and those cathartics which especially stimulate the rectum. The diuretics are such as pass to the kidneys undecomposed, and powerfully stimulate these organs: thus nitre administered in doses of from $\mathfrak{z}i.$ to $\mathfrak{z}i.$, in any bland fluid, possesses decided emmenagogue powers. Foxglove operates in the same manner. Among the emmenagogue cathartics, aloes holds the first rank. Its influence can only be referred to its action on the rectum, and its extension to the uterus, producing a state of the organ closely allied to that which is the result of the application of a direct stimulus to it. The powerful sympathetic influence of aloetics is well illustrated by the effect which sometimes follows their administration after the total cessation of the catamenia. For a certain period after this event takes place, the uterus retains the disposition to take on that state of vascular action which determines the periodical discharge; but it is incapable by its natural efforts to effect the discharge. In this state of uterine susceptibility, the excitement of the rectum by an aloetic purgative almost invariably induces the return of the menses in a slight degree, provided the cathartic be given at the period when the discharge had previously been accustomed to appear. Now if a purgative produce so powerful a sympathetic action when this uterine function has ceased to be any longer essential, we can readily imagine that a more powerful effect is likely to be the result of a similar extension of action from the rectum to the uterus at a period of life when the susceptibility to uterine impressions exists in a high degree. Experience has sufficiently demonstrated that such an extension of action really occurs. In prescribing aloes, however, as an emmenagogue, the cause of the suppression must be kept in view; for this medicine cannot be safely administered in an irritable state of the uterus. To secure its influence on the uterus, it is supposed necessary to administer the medicine in a solid form; but we are of opinion that this supposition is founded on a mistaken idea of its mode of acting; we have seen it

most successful when it has been prescribed in conjunction with alkalies, which greatly aid its solubility. The administration of a pill containing one grain of calomel, the same quantity of powder of digitalis, and three of extract of conium, at bed-time, followed in the morning, by half an ounce of wine of aloes and myrrh, in conjunction with the mineral alkalies and ammonia,* for two or three days previous to the expected return of the menstrual discharge, have, in our hands, proved generally successful. We are usually advised to avoid recommending the use of aloetics to persons subject to hemorrhoids; but although they operate chiefly on the large intestines, the idea that they produce hemorrhoids, or even rouse them to activity in those affected by them, unless the dose be very large, is doubtful.

Black hellebore, *radix hellebori nigri*, is another useful emmenagogue purgative of this class, adapted to plethoric habits: it probably acts by reducing that state of the system which is as adverse to the secretory action of every glandular organ as to that of the uterus. Mead pronounced a high eulogy on the emmenagogue properties of black hellebore; and it continued to be much employed until doubts of its efficacy were raised by Cullen and Heberden,† after which it fell into disrepute; but it is still much prescribed on the continent of Europe and in the United States of America. Dr. Chapman thus expresses himself regarding it: "it is especially useful when it purges, in painful menstruation, attended with torpor and constipation of the bowels, and perhaps with some degree of insensibility in the uterus itself."‡ From the violence of its action as a purgative, black hellebore requires to be administered with caution. If it be employed, the tincture is the best form of preparation; it may be added to any purgative, and thus aid in stimulating the uterus with less risk than is likely to attend the use of the root in substance or its infusion. The extract of the Edinburgh Pharmacopœia, in doses of from gr. iv. to gr. x., combined with extract of conium, has been found useful in the amenorrhœa of chlorotic girls. The same remarks apply to camboge. *Serpentaria*, *valerian*, and *wormwood*, have been employed, in various combinations, to produce emmenagogue effects, and seem to operate chiefly as stimulant antispasmodics. As such, the preparation of valerian, particularly the ammoniated tincture, is indicated in hysterical habits, when the circulation is in a languid state, and the menstrual discharge ushered in with an hysterical paroxysm: it seems to act chiefly by soothing the nervous turbulence; and may be given in doses of from $f\mathfrak{z}i.$ to $f\mathfrak{z}i.$ in combination with decoction of aloes.

* See London Dispensatory, sixth edit. p. 941.

† *Radix hellebori nigri facultatem movendi menstrua sibi vindicavit, quam tamen nullo satis firmo argumento usus nihi confirmavit.*—*Commentarii de Morb. Hist. et Cur.* p. 261.

‡ *Materia Medica.*

The inorganic substances in this division of emmenagogues are, principally, salts of iron, both natural and artificial. The former, which, as they exist in chalybeate waters, are carbonates or sulphates, are most beneficial when drunk at the springs; they raise the pulse in strength, and distribute the blood more equally; and, although the quantity of iron contained in the dose of the water, generally half a pint, be extremely small, yet it operates as a decided stimulant tonic. In plethoric individuals, it is often requisite to bleed and purge before the use of the chalybeate is commenced; and if nausea, pain of the præcordia, vomiting, vertigo, or a feeling of general fullness be, nevertheless, experienced after the waters have been taken, they should immediately be discontinued. All the varieties of chalybeate water prove beneficial in amenorrhœa connected with a pale leucophlegmatic habit; their operation is on the secretory system, which they influence in a slow but uniformly progressive manner, imparting tone, nervous energy, and general vigour. When the habit of the patient is sluggish, the pilula aloes cum myrrha may be administered with each dose of the water. The whole quantity of the chalybeate necessary to be taken in one day should be drunk in divided doses, betwixt each of which brisk walking exercise should be used. The artificial preparations require to be given in much larger doses than those contained in the chalybeate waters, a circumstance which has not been satisfactorily explained. The most common of the artificial preparations employed in amenorrhœa is the official *black oxide* of iron, the scales from the anvil purified. It is a compound of the protoxide and peroxide; the former of which combines readily with the acid of the stomach. The dose is from gr. v. to ℥i.; it may be combined with an aromatic, and administered two or three times a day. Neither the liquor ferri alkalini, nor the ferrum ammoniatum, are active preparations: perhaps the most energetic of all the artificial chalybeates is the tincture of muriated iron; and it possesses the advantage of being compatible with many bitter tonic infusions and decoctions; as, for example, those of gentian, quassia, orange-peel, and such like. If the sulphate of iron be preferred, it should always be in the form of the proto-sulphate; but as this salt is rapidly converted into the persulphate when it is kept in the usual manner, it should be preserved in alcohol.* In the formation, also, of the *mistura ferri composita*, it would be preferable to add the sulphate of iron, in solution, to the mixture of myrrh and subcarbonate of potassa at the moment of taking the medicine, than to prepare it as ordered in the London and Dublin Pharmacopœia. When previously mixed, the car-

bonate of iron, which is at first formed by the exchange of acids between the salt of iron and the alkaline carbonate, is again rapidly decomposed, and transmuted into an inert peroxide of iron; whereas, when managed as we propose, the protocarbonate is formed in the stomach, and immediately exerts its influence upon it, operating as a powerful and effectual tonic emmenagogue. The dose of the protosulphate proper to mix with $\frac{1}{3}$ ℥i. of the myrrh and alkaline solution, is four grains. Its influence is perceived by the rapid change which it induces on the alvine and renal evacuations; the black colour of the former, and the blue streak when the latter is tested with ferrocyanate of potassa, demonstrating that the chalybeate has entered the circulation.

The mediate indirect emmenagogues which influence the uterine function by their action on the nervous system, are all organic substances, both animal and vegetable. Their influence is chiefly useful when amenorrhœa accompanies highly irritable habits, and the suppression is connected with spasm and hysteria. We are of opinion that much confidence cannot be given to *castor* or to *musk*; galbanum and assafetida are more useful; but they are to be regarded merely as aids to more powerful indirect emmenagogues.

On reviewing what has been said on this subject, it is evident that, with the exception of electricity, there is no method of directly stimulating the uterus on which much confidence can be placed; for little benefit has hitherto been derived from stimulating injections; and under these circumstances it may be reasonably questioned whether any medicinal agent can be correctly entitled to the appellation *emmenagogue*.

(A. T. Thomson.)

EMPHYSEMA.—This term, derived from the Greek verb *ἐμφυσάω*, to inflate, is used in medical language to signify the presence of air in the cellular tissue.

The portion of the cellular tissue which is most frequently affected with emphysema is the subcutaneous; but as all the prolongations of this tissue throughout the body are directly continuous, and communicate freely by their areolar structure, the air in emphysema, when once effused in any part of it, may extend wherever cellular tissue exists.

Frank remarks that thin persons are more liable to emphysema than those whose cellular tissue is loaded with fat; and it is matter of common observation, that those parts of the body where the cellular tissue is lax and free from fat are most easily affected with this disease. Thus, the eyelids, scrotum, neck, and sides of the thorax, yield readily to the admission of air, while the buttocks and thighs, the arms and legs are much more slowly distended. The dense cellular tissue which lines the serous and mucous membranes yields with still more difficulty to emphysema, and the palms of the hands and soles of the feet are among the last parts to become so affected.

There are two modes in which emphysema

* Green vitriol consists of 36 parts of protoxide of iron, + 40 of sulphuric acid, + 63 of water of crystallization, = 139: when exposed to the air, oxygen is absorbed, and an insoluble subsulphate produced, which consists of 40 parts of acid, + 160 peroxide of iron, = 200.

may be produced: 1. by the introduction of atmospheric air into the cellular tissue, through a solution of its continuity; or, 2. by the development of gas within the cells of the part. The former is termed *traumatic*, the latter *idiopathic* or *spontaneous* emphysema.

Traumatic emphysema is of much more frequent occurrence than the idiopathic species. It may succeed to any wound of the integuments which allows the external air to get into the subjacent cellular tissue; but in a great majority of cases, (amounting to ninety-nine out of the hundred,) it arises from the introduction of air into the common cellular tissue through a communication formed more or less directly with the organs of respiration. The following are the principal ways in which this communication may be established. 1. By wounds or ulcers communicating with the interior of the mouth or nares. 2. By perforation of the larynx or trachea. 3. By rupture of the air-cells and interlobular cellular tissue, the investing membrane or pleura remaining uninjured, and the air escaping through the roots of the lungs and mediastinum into the general cellular tissue. 4. By perforation of the lung, pleura pulmonalis, and pleura costalis. 5. By penetrating wounds of the chest, the lung and its investing membrane remaining uninjured.

1. Wounds or ulcers communicating with the interior of the mouth or nares.—Frank states that emphysema is not unfrequently produced in persons learning to play on the flute, or other wind instruments, in consequence of the air being forced into the parietes of the cheek through any wound or small ulcer which may happen to exist on its internal surface.* And M. Rullier informs us that the prisoners in the Bicêtre at Paris, when they wished to be transferred to the infirmary, were in the habit of producing an artificial emphysema of the face and throat, by puncturing the inside of the cheek with a pin, and then forcing the breath through the puncture.† In wounds of the under-eyelid communicating with the lachrymal sac, emphysema is not a very uncommon occurrence, the air passing from the nares, through the duct, into the sac, and thence finding its way into the lax cellular tissue in the neighbourhood: in like manner emphysema of the head and face has been observed to take place in cases of fracture of the frontal bone communicating with the interior of the nares.

2. Perforation of the larynx or trachea.—In wounds of the larynx or trachea, part of the air which is expelled from the lungs at each expiration, instead of passing through the glottis, escapes through the wound; but if its free exit is opposed by the narrowness or obliquity of the external orifice, instead of passing out directly, it insinuates itself into the areolæ of the cellular tissue, forming an emphysematous swelling round the wound, and from thence extending all over the body. Instances have also occurred, where, from a severe blow, some of the rings of the trachea

have been ruptured; and the same effect has been said to arise from coughing. We are not acquainted with the records of any case in which perforating ulcers of the larynx or trachea have led to the formation of emphysema; a fact which is probably to be accounted for by the air being prevented from entering the cellular tissue by the adhesive inflammation which usually precedes and limits the ulcerative process.

3. Rupture of the air-cells and interlobular cellular tissue, the investing membrane or pleura remaining uninjured, and the air escaping through the roots of the lung and mediastinum into the general cellular tissue. The rupture of the parietes of the air-cells formed by the ultimate ramifications of the bronchi is by no means an uncommon occurrence; (see EMPHYSEMA OF THE LUNGS;) but so long as the cellular tissue which invests each lobule, and isolates it from those adjoining, remains uninjured, the extravasated air is prevented from escaping beyond the lobule in which the ruptured air-cells are situated. When, however, the cellular tissue which invests each lobule, and which is in fact a prolongation or process of the general cellular tissue, of the body, is likewise lacerated, the air is then at liberty to enter the cells of that tissue which communicate one with another throughout the lung, and through the root of the lung and mediastinum, with the cellular tissue of the throat; so that having once found its way from the ruptured air-cells into the interlobular cellular tissue, it passes uninterruptedly from cell to cell, (when urged forward by a sufficient force,) until it reaches the cellular tissue of the throat, where it makes its appearance in the form of an elastic crepitating tumour over one or both clavicles, and soon becomes diffused over the face and trunk.

This variety of emphysema may be produced by violent fits of straining, coughing, or crying, or any other exertion of the respiratory organs, sufficiently powerful to rupture the air-cells and interlobular cellular tissue; but it has been observed to occur most frequently in women during parturition, and in children severely affected with the whooping-cough. Dr. A. Hamilton, of Edinburgh, observed a case of emphysema produced in this way by the efforts which a young woman made to conceal the pains of labour. She suddenly lost her voice, and her face became swelled in a wonderful manner; her respiration, too, became quick and laborious, and her pulse full and rapid. However, by rubbing the tumid parts twice in the day with camphorated oil, and taking away a considerable quantity of blood from the arm, together with the use of laxative medicines, and an opiate at bed-time, the swelling began to give way in the course of a week; and in proportion as the emphysema disappeared, she recovered her voice. (Halliday on Emphysema.)

Dr. Johnson, the learned professor of Midwifery in the Royal College of Surgeons of Dublin, informs us that six cases of this

* De curand. hom. morbis: Art. Pneumatosis.

† Dict. de Médecine, Art. Emphysème.

accident have occurred in his practice. In general the emphysematous swelling is confined to the neighbourhood of the throat, where it first makes its appearance; but in some cases it extends with a frightful rapidity, and involves the entire surface of the body. In one case it extended to the very tips of the fingers. This form of emphysema is likewise occasionally produced by violent paroxysms of the whooping-cough. Dr. Johnson has known it occur in three cases of this disease; and Dr. Mackintosh of Edinburgh, and the late Dr. Beattie of Dublin, mentioned to us similar cases that had fallen under their observation. An interesting case of this form of emphysema is also recorded by Dr. Ireland, in the third volume of the Dublin Transactions.—“A child nine years old was attacked with pneumonia. Under appropriate treatment the inflammatory symptoms seemed to subside, but a severe cough remained behind, during a violent fit of which a colourless crepitating swelling was observed to form above the clavicles, and extended rapidly until it spread over the whole body. The child died, apparently of suffocation, on the fifth day after the appearance of the emphysema.” A case of emphysema of this kind is related by Louis,* which was produced by the efforts made to expel a bean that had fallen into the larynx. We have, however, had opportunities of observing that a fatal suffocation may be caused by the presence of a foreign body in the air-tubes, without necessarily producing this symptom.

It is probable that many cases of emphysema supposed to be spontaneous are really produced in this manner. Thus, the emphysema which sometimes appears on the sides of the thorax when much force is employed to reduce a dislocation of the humerus, probably arises from the escape of air in the manner we have described, through a rupture of the air-cells caused by the violent efforts which the patient makes to hold in his breath during the reduction of the dislocation. In like manner the emphysematous swellings which have been noticed by Frank, Cullen, and other practical writers, as occasionally occurring during the paroxysms of hysteria, may proceed from the air being forced through the cellular tissue of the lung and mediastinum, by the violent efforts at expiration which are made during the paroxysm, while the aperture of the glottis is kept spasmodically constricted.

The great difficulty of breathing which occurs in this form of emphysema is sufficiently accounted for by the distention of the lung, from the infiltration of its interlobular tissue with air, and by the emphysematous swelling of the mediastinum.

4. Perforation of the lung, *pleura pulmonalis*, and *pleura costalis*. This triple lesion may be produced—1. by fracture of the ribs; 2. by penetrating wounds of the chest and lungs; 3. by ulceration. As the emphysema which arises from the first two of these causes belongs more particularly to the province of surgery,

we shall notice it very briefly, and refer the reader, who wishes for further details, to the works of surgical writers.

There is no accident which so frequently gives rise to emphysema as fracture of the ribs; for when the sharp ends of the fractured bones protrude through the *pleuræ* and lacerate the *parenchyma* of the lung, the air passes freely through the bronchi into the sac of the *pleura*, and thence through the breach in the costal *pleura* into the subcutaneous cellular tissue, from whence it becomes diffused all over the body, as there is no opening in the integuments through which it can escape externally. At each dilatation of the chest the air is sucked into the thorax through the lacerated air-cells, and diffused uniformly over the surface of the lung, (supposing that no adhesions exist,) while at each effort of expiration the stratum of air contained within the *pleura*, being compressed by the contraction of the thoracic *parietes* against the entire pulmonary surface, is prevented returning by the wound through which it had previously entered; in this way the air continues to accumulate within the sac of the *pleura*, until it becomes so condensed, especially during the efforts of expiration, as to exert a very considerable degree of pressure on the *parietes* of the chest, and the important organs contained within it. The air then forces its way through the breach in the costal *pleura* made by the protrusion of the fractured bone, and escapes into the cellular tissue on the outside of the thorax, whence it is rapidly diffused all over the body, a fresh supply of air being forced out at each expiration, so long as the wound in the lung continues permeable.

From this view of the mechanism by which emphysema is produced in the case of a fractured rib, it is evident that the escape of air into the cellular tissue, which has commonly been looked upon as the most dangerous part of the disease, should with more propriety be regarded as a favourable circumstance, inasmuch as the air which escapes in this way would, if confined within the *pleura*, oppress not only the lung of that side where it is contained, but, by hindering the play of the diaphragm, and thrusting the mediastinum over into the opposite side, oppress the other lung also, and so produce great difficulty of breathing, or even a fatal suffocation.

In the greater number of cases of emphysema arising from fracture of the ribs, the wound of the lung is soon closed by the effusion of blood, or by adhesive inflammation; after which the further escape of air into the *pleura* ceases; that already effused is promptly absorbed; the respiration is no longer laborious; the subcutaneous emphysema ceases to extend, and in the course of a few days is removed by absorption.

But in more severe cases the wound of the lung remains unclosed, and a fresh supply of air is pumped into the cellular tissue at each expiration, until the whole body becomes so distended as scarcely to retain a semblance of the human form. The following “History of an Emphysema,” from the pen of Dr. William

* Mém. de l'Acad. de Chir. t. iv.

Hunter, is exceedingly characteristic of the appearances produced by excessive distention of the subcutaneous cellular tissue, and of the peculiar difficulty of breathing caused by the pressure of the air accumulated within the sac of the pleura:—"The patient had received a considerable hurt in his side by a fall from his horse. When first seen by Dr. Hunter (twenty-nine hours after the accident), he was in bed, panting for breath; his form was that of a human skin stuffed. The inflation was great and universal, except in his hands and feet, where it was very inconsiderable. The skin was everywhere shining, as it is when much extended by any kind of swelling. The air could easily be pressed out from any part, but it immediately returned upon taking off the hand. When struck, his body sounded like a wet drum; and when pressed, the air could be felt, and its sound distinctly heard. The cellular membrane was less inflated, and the skin less distended upon his extremities, in proportion nearly to the distance of the part from his chest. Those parts on the surface of the body which have a more loose and yielding cellular membrane were proportionably more swelled; thence his eyelids were so fixed by their own bulk that he had not been able to see light from a few hours after the accident happened. The penis and scrotum were as much distended as in the worst anasarca."

It is impossible to convey a more accurate description of the appearance which this disease presents in its most aggravated form. Dr. Hunter's description of the difficulty of breathing produced by the air accumulated within the sac of the pleura, is equally characteristic: "His breathing was very laborious, and rather frequent, in the following manner:—his inspiration was so short as to be almost instantaneous, and ended with that catch in the throat which is produced by shutting the glottis; after this he strained to expire without any noise; then suddenly opening the glottis, he forced out his breath with a sort of inward groan, and in a hurry, and then quickly inspired again; so that his endeavour seemed to be to keep his lungs always full. Inspiration succeeded expiration as fast as possible. From the small quantity that was inspired and expired at a time, it was plain that he either had not room for a greater quantity, or could not bear a greater expansion of the chest."*

When the surface of the lung is attached by adhesions to the costal pleura, the air which escapes from the wounded lung cannot accumulate within the chest, but passes directly through the corresponding wound of the costal pleura into the cellular tissue on the outside of the thorax; in which case there is no pneumothorax, and the difficulty of breathing is consequently much less.

Emphysema may likewise be produced in this way by penetrating wounds of the chest and lungs. It has, however, been observed that these wounds are not as constantly followed by emphysema as fracture of the ribs is.

The mechanism by which the emphysema is produced is the same in both cases, the air first escaping through the wounded lung into the sac of the pleura, and thence through the wound of the costal pleura into the subcutaneous cellular tissue. When the wound of the integuments is large, and directly parallel to its internal orifice, the air has an open and unobstructed issue, through which it passes; but when the external wound is narrower than its internal orifice, or only communicates with it obliquely, the air which is forced out may then insinuate itself into the areolæ of the cellular tissue, and thus produce emphysema.

Mr. Hewson endeavoured to produce artificial emphysema by cutting and wounding the lungs of rabbits and dogs in various ways; but all his experiments were unsuccessful: no air was effused either into the cavity of the thorax, or into the cellular membrane. From these experiments he concluded that a puncture or incision of the lungs would seldom produce emphysema, on account of the effusion of blood from the divided vessels, and that the escape of air is more apt to follow a superficial abrasion or laceration of the part, such as is produced by the extremity of a fractured rib; and experience has fully confirmed the accuracy of these conclusions.*

M. Litre has published a case of emphysema produced by the thrust of a small sword, which is remarkable on account of the enormous distention of the cellular tissue that took place. The emphysema commenced soon after the accident, and the patient died in two days. On examination after death, the emphysematous swelling on the chest measured eleven inches thick, on the belly nine, on the neck six, and four on the other parts of the body; the wound in the lungs was seven or eight lines long, one and a half broad, and one deep.†

Ulceration of the lung, pleura pulmonalis, and pleura costalis, is the last mode we have enumerated in which a communication may be formed between the interior of the lung and the cellular tissue on the trunk. In some cases a direct communication is thus formed, as when a circumscribed empyema that points externally between the ribs, or an abscess primarily formed in the parietes of the chest, bursts internally into the bronchi, and thus forms a direct communication between the air-passages and the abscess on the thorax. In such cases the pus is evacuated by the bronchi, and its place is supplied with air, which may either infiltrate the cellular tissue of the trunk, producing general emphysema, or, if the walls of the abscess have been rendered impermeable by adhesive inflammation, may be prevented from escaping further, and thus produce a circumscribed emphysematous tumour, bearing the same relation to diffuse emphysema that phlegmonous abscess does to common cellular inflammation. A remarkable case of this kind,

* See Hennen's Principles of Military Surgery, J. Bell on Wounds, and Baron Larrey's Mémoires de Chir. Militaire.

† Mém. de l'Académie Royale des Sciences, for 1713.

* Med. Obs. and Inquiries, vol. ii.

in which several emphysematous tumours were formed in succession over the surface of the chest and neck, is recorded by Dr. Duncan, in the first volume of the *Medico-Chirurgical Transactions of Edinburgh*.

This communication may likewise take place indirectly, the air first escaping through an ulcer on the surface of the lungs into the sac of the pleura, producing pneumothorax, and thence, through an ulcer of the costal pleura, into the cellular tissue of the trunk. A remarkable instance of this kind is related by Dr. Halliday. The patient had felt unwell for some days, and on the evening before his admission into hospital was seized with rigors and severe headach; he had also a slight cough, which excited some pain about the superior part of the sternum. Early the next morning he began to complain of great difficulty in respiring; at twelve o'clock the breathing had become more severe, his face was turgid, and his lips quite livid; there was also at this time an unusual fulness of the neck and breast, which, when pressed, yielded an evident crackling noise. In about half an hour after, this fulness was become not only more evident, but was diffused all over the chest, and down both arms; he had now the greatest difficulty in respiring at all, and before one o'clock every part of the surface of his body was become emphysematous, except the palms of his hands and the soles of his feet. On inspection after death, the right lung was found to contain, in its upper lobe, a vomica of about three inches in circumference, from which it appeared that about four ounces of pus had very lately escaped into the sac of the pleura, through an opening which would scarcely admit the head of a probe: upon blowing into the trachea it was observed that the air passed freely through this opening into the sac of the pleura. On searching for the opening through which the air had escaped from the cavity of the thorax, a small part of the pleura costalis, between the sixth and eighth ribs, was discovered with the appearance of being more inflamed than any other part; and nearly in the centre of this small spot an opening was detected, through which the pleura and cellular membrane were easily inflated.*

5. Emphysema may likewise be produced by penetrating wounds of the chest, even though the lung and pulmonary pleura remain uninjured. The formation of emphysema in such cases may be explained as follows. In all wounds of the chest where the air is admitted into contact with the pulmonary pleura, the lung generally collapses, when not prevented from so doing by emphysema of its tissue, or by old adhesions: a sort of false respiration is then established, air being inspired into the chest through the wound at each dilatation of the thorax, and alternately expired through the same orifice at each contraction of the thoracic parietes. But when, as not unfrequently happens, the wound remains direct and unobstructed during inspi-

ration, but becomes oblique or even closed by the alteration in the relative position of the integuments and ribs during expiration, it follows that the air having a free ingress into the thorax during inspiration, and not having as free an egress during expiration, must suffer such a degree of pressure from the contraction of the chest as to be forced into the subcutaneous tissue, and so produce general emphysema.

The last variety of traumatic emphysema we shall notice is that produced by the escape of air from the alimentary canal, through a rupture of its parietes. It appears from an interesting work, published by M.M. Chabert and Huzard, entitled, "*Observations sur les Animaux Domestiques*," that this accident is not of unfrequent occurrence in ruminating animals, in consequence of their food fermenting and generating such a quantity of gas as ruptures the internal tunic of the intestines, insinuates itself into the subserous cellular tissue, and thence extends all over the body. Haller mentions a case of emphysema produced in this way in a female, whose intestines were so over-distended by the quantity of gas they contained, that they at last gave way and allowed the air to escape into the cellular tissue.*

In the eleventh volume of the *Archives G n rales de M decine* there is a very interesting case of an extensive emphysema produced in this way by a violent contusion on the abdomen.

We have now enumerated the principal varieties of *traumatic* emphysema, and described the mechanism of their formation; but we have yet to consider another form of this disease, in which the air is not introduced from without, but is formed within the cellular tissue of the part, and which, as arising from no very evident cause, has received the denomination of *idiopathic* or *spontaneous*.

The air or gaseous product which is formed in spontaneous emphysema may be produced either by putrefactive decomposition or by secretion.

1. Spontaneous emphysema caused by the extrication of gas from a putrefactive decomposition. The living body is composed of various elements, which are only prevented from decomposing and entering into new combinations by the powers of life, which, by a counteracting influence, prevent the chemical affinities of these elements from coming into full operation; but no sooner do those powers cease to act, than the body begins to decompose under the influence of the chemical and physical laws which govern all inert matter. One of the most constant phenomena of this putrefactive decomposition is the disengagement of various gases; hence it is that dead bodies become emphysematous during putrefaction, and that the bodies of drowned men are after some days buoyed up and float on the surface of the water.

The extrication of gas from the death and decomposition of a part may likewise occur

* Op. Cit.

* Opusc. Pathol. Obs. xxxi. tom. iii.

during life, as in the case of gangrene. Indeed this is by no means a rare occurrence, particularly when the gangrene is of the humid species. "I took particular notice (says Dr. Hunter) of the emphysema in a case of mortification from an internal cause, which began upon the ankle, and thence marched upwards upon the limb till it came to the groin, when the patient died. The cellular membrane under the skin was very sensibly inflated every where, to some distance from the mortified part, and I could as easily mark the progress of the mortification from day to day by the emphysema as by the change of colour in the integuments."* Practical writers have remarked that gangrene, when accompanied with emphysema, has a remarkable disposition to spread.†

The period at which the putrefactive decomposition commences after death depends in a great measure on external circumstances, such as heat, moisture, &c.; but it is also materially influenced by the condition of the fluids, which in some cases have a much greater tendency to putrescency than in others; as is proved by the well-known fact that some bodies will remain for several days without exhibiting any sign of decomposition, while others from the state of the fluids swell up and run into putrefaction immediately after death. In the typhous fever that raged in the south of Ireland during the year 1817, it was found necessary to bury the bodies of those that died within a few hours after death, and to fill up the graves with lime.

The same tendency to putrescence is sometimes observed during *life*, in certain morbid conditions of the economy, which have hence obtained the name of *putrid* or *malignant diseases*. We know, from direct experiment, that the introduction of certain deleterious substances into the blood, such as pus, putrid animal matter, and certain poisons from the animal, vegetable, or mineral kingdom, produces certain alterations in it, by which it loses its power of coagulating, and acquires a tendency to rapid decomposition. Similar alterations are likewise produced in the blood by the sting or bite of certain animals, especially those of the serpent tribe; and are also observed in the spasmodic cholera, the plague, and other diseases of a malignant nature, as it is termed; in all which some of the most constant phenomena are a sudden prostration of strength, a constant tendency to hemorrhage, and a remarkable disposition to mortification wherever congestions are formed.‡ In such cases the *vis vite* is actually diminished throughout the whole system, and the laws which govern all inorganic matter begin to exert their influence over the body while yet alive, producing, amongst other symptoms of decomposition, spontaneous emphysema.

"A full-bodied middle-aged sailor was seized with a putrid fever and sore throat; he was bled at the beginning, but his blood

appearing in a loose dissolving state, he was bled no more: about the seventh or eighth day of his disease, an emphysematous swelling appeared in his face, neck, and all over his breast, especially on the right side; the swelling was fomented with sharp vinegar and camphorated spirit of wine, and under this treatment totally vanished in two or three days, and he soon recovered from the fever; but he continued very weak for a long time, and remained very scorbutic as he was before the fever, his gums being very spongy and bleeding on the slightest touch. In this case the emphysema was generated merely by the putrescence of the humours, as is frequently observed in a less degree in and about the incipient gangrene of the limbs; and I am persuaded that this more frequently happens in putrid malignant fevers than is commonly imagined."*

Frank states that the epidemic fever which raged at Bobbio, a small town in Italy, in 1789, frequently terminated in general emphysema; and that a similar epidemic had previously occurred in Germany in 1772, during which emphysematous swellings suddenly appeared on the face and neck, and sometimes extended all over the body.†

Neither is this development of gas from the decomposition of the fluids peculiar to man. Dr. William Hunter has transmitted to us the history of an epidemical distemper prevalent among the black cattle in the neighbourhood of London, in which it was observed. At first, almost all died that were taken ill of it; most of the diseased were emphysematous all over their body; and on dissection the emphysema was found to be universal upon all the internal parts, as well as under the skin.‡ Frank likewise alludes to an epidemic dysentery among the black cattle, during the progress of which the loins and back were frequently observed to become emphysematous.

The last illustration which we shall adduce is one lately exhibited in Paris, at the Hôpital Cochin, an account of which was read by M. Bally at the Académie Royale de Médecine. A man, twenty-five years of age, who had been ill for fifteen days, was admitted into the hospital with symptoms of typhous fever; he also complained of pain in the left thigh; and, whilst he was in a state of delirium, said he had been bitten on the knee by a dog. The limb was most attentively examined, but not the slightest trace of such an accident could be discovered. The thigh and scrotum were much swollen. He died the following day. On dissection, *eight hours after death*, the surface of the body was found soiled by blood, which had transuded through the integuments; and some blood had also been discharged from the nose. The whole body was emphysematous, but the left inferior ex-

* Medical Observations and Inquiries, vol. ii.

† James on Inflammation, p. 96.

‡ Andral's Pathol. Anat.

* Huxham, Medical Observations and Inquiries, vol. iii. p. 33.

† De Curandis Hominum Morbis, tom. iv. Pt. I. Pneumatoxis.

‡ Op. Cit. vol. ii.

tremity was so to a very high degree. It was double its natural size, of a brown colour, and covered with numerous phlyctenæ—some black, of great extent, and collected in clusters, from which escaped a reddish serous fluid mingled with a quantity of gas; others white, from which nothing but air escaped. When the limb was pressed with the hand, crepitation was distinctly heard; the abdomen was much distended with gas; and in the intestines were observed those alterations that are so common in cases of typhous fever. Bubbles of air filled the vessels of the pia mater, and the left vena saphena. The lymphatic ganglions of the mesentery were enlarged and contained gas, *which took fire from the flame of a taper*, and produced an explosion; the same phenomenon also followed the exit of the air which was contained in the legs, thighs, and scrotum. A puncture was made into the abdomen, and the gas which escaped also took fire and burned for some time, the flame being blue at its base, and white at its summit: the combustion extended to the puncture which had been made with a trochar; the edges of this aperture became black, and were consumed, and the aperture itself was enlarged to double its original size. The gas which was contained in the subcutaneous cellular tissue was equally inflammable.*

This case is peculiarly interesting in consequence of the light it throws on the etiology of spontaneous combustion. On referring to the article on this subject it will be found that, in all those cases of spontaneous combustion of which we have an authentic history, the flame was communicated by the contact of a body in a state of ignition, and it is reasonable to suppose that the combustion was likewise supported by an inflammable gas generated within the body, as in the present instance.

Some doubt may be entertained whether this inflammable gas should be considered as the product of a putrescent decomposition formed by the ordinary laws of chemical attraction; or as a morbid secretion, the product of a vital action, and regulated by the same vital laws as other secretions.

On this subject much yet remains to be discovered, as our present knowledge only amounts to this, that collections of air are sometimes found in the living body, under circumstances where there is no appearance of their having been generated by fermentation or putrefaction; and that both in man and other animals, certain tissues possess the power of secreting gas, as, for instance, the swimming bladder in fish, the mucous membrane of the stomach and intestines in man, and the mucous membrane of the air-passages, which, as the accurate experiments of Dr. Edwards clearly prove, secretes a variable quantity of carbonic acid and azotic gases. The fact of a gaseous secretion being formed by certain tissues in the healthy state being established, we are authorized by analogy to conclude

that a secretion of gas may, like other secretions, take place as a morbid phenomenon in parts where no such secretion naturally occurs, more especially as we possess several well authenticated cases in which it is impossible to account for the presence of the gas in any other way. It must, however, be confessed that we are completely ignorant of the causes that influence the production of gaseous secretions, and of the condition of the solids or fluids most favourable to their development: if they are preceded or accompanied by any alterations of texture, they are such as entirely to escape our notice. The chemical composition of these secretions is also a desideratum.

Such being the state of our knowledge, we shall not enter into the consideration of any of the hypotheses which have been formed on this subject, but merely notice the fact, generally admitted by pathologists, that spontaneous emphysema is occasionally produced by a secretion of gas within the areolæ of the cellular tissue.

Dr. Baillie has recorded a very remarkable case of this kind, in which the emphysema was so extensive as to affect the alimentary canal and the mesentery, as well as the whole of the subcutaneous tissue; yet in which there was no solution of continuity through which the air could have been introduced, and no appearance of any putrefactive decomposition, by which it could have been generated. Frank likewise relates several cases of spontaneous emphysema, which it is difficult to account for on any other supposition than that of their being a product of morbid secretion; such, for instance, is the case of a young lady at Vienna, who became generally emphysematous during every paroxysm of a tertian fever, the emphysema disappearing as the paroxysm subsided. Many other curious instances of this disease are to be found in the chapter on PNEUMATOSIS, in the 8th volume of this author's work "*De Curandis Hominum Morbis*."

The *diagnosis* of emphysema seldom presents any difficulty when the disease affects the subcutaneous tissue, as it then produces an uniform swelling, sufficiently characterized by its lightness and elasticity, and by the peculiar crepitating sound and feel it yields under the finger, from the displacement of the air from one cell into another.

The *prognosis* must be regulated more by the cause of the emphysema, and the state of the respiratory organs, than by the extent of the emphysematous swelling. The emphysematous distention of the integuments is much more formidable in appearance than in reality, and, when unconnected with any lesion of the organs of respiration, may be very extensively diffused without producing any injurious consequences. Aristotle says that it was a common practice in his time to inflate the subcutaneous tissue of animals in order to make them fatten more readily afterwards: this practice is also alluded to by Pliny; and Schulze states that the only effect it produces on horned cattle is to render them dull and

* London Medical and Physical Journal, for June, 1831.

heavy for two or three days, after which time the emphysema gradually disappears, they recover their spirits and appetite, and in the course of six weeks become quite fat.* Haller and Soëmmering likewise attest the truth of these observations, which at least serve to prove that the effusion of air into the cellular tissue is not in itself productive of much injury, and that the sense of suffocation, and other formidable symptoms which so often accompany the progress of this affection, depend more on the diseases with which the emphysema is complicated than on the emphysema itself. This conclusion is further confirmed by the result of those cases of emphysema that have been observed in the human subject, uncomplicated with any lesion of the organs of respiration. Sauvages mentions the case of a soldier, who was found asleep in a cave by some persons who inflated his body through a quill until it scarcely retained a vestige of the human form,—all the lines of demarcation between the face, throat, and trunk being completely destroyed. In this case, which may be regarded as a rare example of general and extensive emphysema unconnected with any lesion of the respiratory organs, the principal symptoms observed were pain and stiffness from the over-distention of the integuments, and difficulty of breathing from the impeded motion of the thorax, and the congestion of the lungs, arising from the pressure which the superficial bloodvessels sustained; these symptoms disappeared as the air was evacuated through several scarifications which the patient had given himself with a knife, and his recovery was rapid and complete.

We may, therefore, conclude that the extreme difficulty of breathing, which so frequently accompanies traumatic emphysema, and which is in almost every instance the immediate cause of death in those cases that prove fatal, is in reality produced, not by the emphysematous distention of the integuments, but by the air effused into the sac of the pleura, or into the interlobular tissue of the lung.

Treatment.—The practice in emphysema must be regulated in a great measure by the cause of the affection, the extent of the emphysematous swellings, and the state of the respiration: the general indications of cure may, however, be arranged under three heads: 1. to arrest the progress of the emphysema, by preventing a further effusion of air into the cellular tissue; 2. to remove the air already effused; and, 3. to relieve the disordered state of the respiration. The means employed for the fulfilment of the first indication must be regulated by the cause of the emphysema.

In *spontaneous emphysema*, the only effectual method of arresting the further progress of the disease is, to correct the morbid state of the system on which the development of the gas depends, and of which it is merely

a symptom. As it generally occurs during the progress of asthenic or typhoid diseases, aromatic and stimulating liniments should be applied externally, in order to promote the action of the capillaries, while the proper remedies adapted to the disease are administered internally. Should the emphysema spread extensively, it may be proper to relieve the distention of the swollen parts by puncturing them with the point of a lancet.

In *traumatic emphysema*, arising from wounds of the larynx or trachea, the further effusion of air into the cellular tissue may be prevented by enlarging the external orifice of the wound, so as to make a direct passage for the exit of the air during expiration; the same practice should also be adopted when the emphysema arises from penetrating wounds of the chest, after which the wound should be closed with adhesive plaster.

When the emphysema arises from a fractured rib, the further effusion of air into the cellular tissue may be prevented by applying a tight roller round the chest, or by making small punctures through the integuments over the seat of the fracture.

When the breathing is not much oppressed, the application of a bandage may be employed with safety and advantage. But as (supposing that the surface of the lung is not adherent) the air is effused from the wounded lung into the sac of the pleura, before it escapes into the cellular tissue, it is plain that by applying a bandage round the chest in order to prevent the further progress of the emphysema, we only confine the air within the pleura, where, if it continues to accumulate, its presence must give rise to all the distressing symptoms of pneumothorax, as it not only compresses the wounded lung, but, by its pressure on the mediastinum and diaphragm, obstructs the dilatation of the other lung also: under such circumstances every facility for the enlargement of the chest becomes necessary, in order to admit as much air as possible into the lung, which still executes its functions; but the effect of the bandage is to diminish the dilatation of the sound side as well as that of the diseased, and, consequently, to increase still farther the embarrassment of the respiration.

For these reasons, it is much safer where the breathing is at all embarrassed, to let the air escape by making several punctures or small incisions over the broken rib, than to confine it with a bandage, though the latter practice may be employed with advantage in those cases where the quantity of air effused into the chest is not sufficient to produce much dyspnoea or oppression.

Lastly, in the cases of emphysema arising from over-distention and rupture of the air-cells, and the escape of air into the interlobular tissue of the lungs, and thence through the mediastinum into the common cellular tissue, the only method of arresting the further effusion of air is by employing such means as are calculated to diminish the violence of the respiratory efforts by which the air is forced,

* Dictionnaire des Sciences Médicales. Art. *Emphyseme*.

at each respiration, into the mediastinum. With this view copious venesection should be employed, for the double purpose of relieving the pulmonary congestion, and of diminishing the mass of the circulating fluid; for, by lessening the quantity of blood to be aerated, we also lessen the necessity for taking in so large a supply of air for its aeration, and in the same proportion diminish the efforts made by the muscles of respiration to dilate and contract the thorax. Opiates should likewise be employed with the same intent, to diminish, as Laennec expresses it, "le besoin de respirer;" rest and silence should be enjoined, and the antiphlogistic regimen strictly enforced.

We next come to consider the means of removing the air already effused into the cellular tissue. In the slighter cases of emphysema, where the breathing is not much oppressed, and the quantity of air effused is not very great, the power of the absorbents will generally be found sufficient for its removal, and it will only be necessary to employ friction over the tumid parts with camphorated liniment, or some other stimulating embrocation, for the purpose of accelerating the process of absorption: but when the quantity of air effused into the cellular tissue is so great as to produce considerable distention of the integuments, it will be advisable to make several punctures, with the point of a lancet, through the skin where it is most distended, in order to evacuate the air contained underneath. These punctures or scarifications should be made sufficiently deep to divide the cellular tissue, in order to make a free exit for the air from the deep-seated as well as from the superficial cells. If the air should have spread extensively over the body, it will be more advisable to puncture the skin wherever the parts are much inflated, than to press it along under the skin to the punctures which may have been made in a distant part. This practice should be adopted in all cases of extensive emphysema, from whatever cause it may have arisen; as it is perfectly free from danger, and affords immediate relief to the suffering arising from over-distention of the swollen parts, and likewise obviates the danger of the air forcing its way into the cellular tissue of the internal organs.

We have already seen that in the great majority of the cases of traumatic emphysema the organs of respiration are more or less injured, and that it is from the injury which they sustain that the most distressing and dangerous symptoms invariably arise. To them, therefore, our principal attention should always be directed as the most important object of our treatment. In all cases of extensive emphysema the breathing is more or less oppressed, in consequence of the diminished mobility of the thorax, and the congested state of the lungs caused by the increased quantity of blood thrown on them from the surface of the body. In such cases, therefore, it will be proper to relieve the internal congestions by copious bloodletting, and to remove the pressure which impedes the motion

of the thorax, by evacuating the air confined under the integuments as already directed. Venesection is also useful in such cases, as the most powerful means we possess of anticipating or arresting the development of inflammation.

Should these measures prove insufficient for the relief of the breathing, we may then infer, (especially when the sense of oppression and suffocation continue progressively increasing, and other symptoms indicate the existence of pneumothorax,) that air is accumulating within the chest, so as to oppress not the wounded lung only, which was collapsed and useless from the first, but the diaphragm and mediastinum, and through them the opposite lung also. A freer incision should then be made through the integuments over the seat of the injury, and if this does not afford sufficient vent to the air confined within, the incision should be continued through the intercostal muscles, and a small puncture cautiously made into the pleura. Mr. Hewson, who has written an excellent paper on this subject, in the third volume of the *Medical Observations and Inquiries*, recommends that the operation should be performed, as in cases of emphysema, on the fore part of the chest, between the fifth and sixth ribs at the right side, as there the integuments are thin, and in the case of air no depending drain is required; but if the disease is on the left side, he considers it more advisable to make the opening between the seventh and eighth, or eighth and ninth ribs, in order that we may be sure of avoiding the pericardium. The perforation of the pleura will be immediately followed by the escape of the condensed air, the pressure of which being removed, the mediastinum and diaphragm will regain their natural position, and the opposite lung will thus be enabled to resume the free and unobstructed discharge of its functions; after which the wound should immediately be closed with adhesive plaster, in order to prevent the alternate ingress and egress of air during the dilatations and contractions of the thorax. Should the symptoms of oppression and suffocation again return, the wound may be opened as occasion requires, and the accumulated air suffered to escape.

It sometimes happens that the necessity of performing the operation of paracentesis is apparent from the oppressed state of the breathing and other urgent symptoms of pneumothorax, but that from the nature of the accident, and the extreme distention of the integuments, it is difficult to ascertain at which side the operation should be performed;—a point in reference to which an error may be attended with the most fatal consequences, as actually occurred in a case recorded by Dr. Halliday. "The operation of paracentesis was resolved on in consultation, and an incision was accordingly made between the sixth and seventh ribs on the *left side* of the thorax. As soon as the opening was made into the cavity of the chest, every distressing symptom became more severe, and the patient scarcely

survived a quarter of an hour." On dissection, it was discovered that the operation had been performed on the sound side.*

In order to avoid the possibility of committing so fatal a mistake, the existence of pneumothorax, and its precise seat, should always be clearly ascertained by the physical signs of this disease furnished by auscultation and percussion (see PNEUMOTHORAX) before the operation is undertaken; and should the emphysematous state of the integuments prevent their employment, or obscure the indications which they afford, several punctures should be made over the chest, and the air pressed towards them, until the emphysematous swellings are reduced; after which, the precise extent and seat of the pneumothorax may be ascertained with that degree of accuracy which the labours of Laennec have rendered so characteristic of this department of medical science.

Some writers use the term emphysema in a more extended signification than that which has been assigned to it in this article, and apply it to all preternatural accumulations of air, in whatever part of the body they are situated. But, as these collections of air have each received distinct names, according to the cavities or organs in which they are situated, such as pneumothorax, tympanitis, physometra, &c. their description will find a more appropriate place in the articles respectively allotted to these subjects. Emphysema of the lungs alone forms an exception, and will therefore be treated of in the next article.

(R. Townsend.)

EMPHYSEMA OF THE LUNGS.—The morbid appearances presented by this disease have been noticed by Bonetus, Morgagni, Van Swieten, Storck, and other anatomists. In this country we have a very correct account of an emphysematous lung from the pen of Sir John Floyer; and Dr. Baillie's work on Morbid Anatomy contains an accurate description of the three principal circumstances which characterize this lesion, namely, the great size of the lungs, the dilatation of the cells, and the vesicles formed by extravasation of air under the pleura. The discovery of its frequent occurrence as a disease, of its etiology, and diagnosis, was, however, reserved for the pathological researches of M. Laennec. In order to render the following observations intelligible, it will be necessary to premise a few observations on the anatomical structure of the pulmonary parenchyma, as the emphysematous condition of this viscus is, in many cases, merely an exaggeration of its natural or healthy structure.

If we examine in a good light the surface of a sound lung, we can ascertain by the naked eye, through the transparent pleura, that its parenchyma is formed by the aggregation of a multitude of small vesicles of an irregularly spheroid or ovoid figure, full of air, and separated from each other by opaque white

partitions. These vesicles, which on the surface of the lungs have the appearance of small transparent points, are not of an uniform size; the largest are equal to the third or fourth part of a millet-seed. They are grouped in masses or lobules, divided from each other by partitions of closely condensed cellular membrane, very thin, yet thicker and more opaque than the partitions between the individual cells. These partitions traverse the pulmonary substance in all directions, and crossing each other under various angles, form figures of different shapes, such as lozenges, squares, trapeziums, or irregular triangles, the bounding lines of which are rendered still more defined by the black pulmonary matter that is deposited along them.*

If we analyze this structure, we find that it is composed, 1st, of the minutest ramifications of the bronchi, which go on subdividing and diminishing in caliber until they terminate each in a cul-de-sac or air-cell, as it is commonly termed, of extreme delicacy and minuteness, on the parietes of which the pulmonary vessels ramify in an extreme state of fineness;† and, 2dly, of the common cellular membrane which serves to connect these air-cells together, and which likewise forms several membranous partitions that divide each lobe into a number of distinct lobules, and is hence termed the *interlobular cellular tissue*, each lobule being as perfectly isolated from those adjoining it by this partition, as each lobe is by its investiture of pleura.

Each of these textures is liable to emphysema, and hence we have two varieties of this disease in the lung: 1. *the vesicular or true pulmonary emphysema*, (as it is somewhat arbitrarily termed by Laennec,) formed by the dilatation of the minute bronchi and air-cells, or by the rupture of their parietes, by which several contiguous cells are thrown into one; 2. *the interlobular emphysema*, formed by the infiltration of air into the interlobular cellular tissue. The former usually occurs as a chronic disease, while the latter as generally assumes the character of an acute affection.

I. *Pulmonary or vesicular emphysema.*—In pulmonary emphysema the size of the air-cells is much increased and is less uniform. The greater number equal or exceed the size of a millet-seed, while some attain the magnitude of hemp-seed, cherry-stones, or even French beans.‡ We are disposed to think, however, that cavities of such a size are rarely formed by the dilatation of individual cells, as in more than one hundred dissections which we have made of pulmonary emphysema, we never except in one instance saw the air-cells dilated to the size of a garden-pea; in the great majority of cases the cavities of this size, or even of a less diameter, are formed by several cells being thrown into one, in consequence of their delicate partitions being overstrained and ruptured. In some cases, the walls of the cells

* Forbes's Translation of Laennec.

† Reisseisen, De Structura Pulmonum.

‡ Laennec.

disappear from one entire lobule, leaving only some lacerated filaments traversing its cavity from one interlobular partition to another, and in some instances these partitions are also lacerated, and their respective lobules are thus thrown into one large cavity, which usually reaches the surface of the lung, and forms a projection under the pleura. In order to see these alterations of structure, it is necessary to inflate the lung and dry it previous to examination, as without this precaution the cells collapse immediately when cut into, and all appearance of emphysema is consequently lost.

"Emphysema may affect both lungs at the same time, one only, or a part of one, or both: in the latter case, and, indeed, in any case, as long as the disease is confined to a simple dilatation of the cells, or to the rupture of a few of their partitions, and does not form vesicles of any considerable size on the surface of the lung, it may be easily overlooked in the dead body; for this reason, the disease, which is really one of the most constant morbid appearances in all cases of protracted dyspnoea, has been as constantly overlooked, and in this way the lungs of asthmatic patients have been regarded as healthy when they are in reality emphysematous, and cases of dyspnoea set down as nervous or idiopathic, for which anatomy has now discovered an organic cause.

"When the disease exists in a very high degree, we cannot help being struck with the appearance of the parts. The lungs seem as if confined within their natural cavity, and when exposed, instead of collapsing as usual, they rise in some degree, and project beyond the borders of the thorax. If we examine them in this state, they feel firmer than natural, and it is more than usually difficult to flatten them. The crepitation they yield on pressure, or being cut into, is less, and of a kind somewhat different; it is more like the sound produced by the slow escape of air from a pair of bellows, and the air makes its escape from the cells much slower than in a healthy state of the organ. When we detach the lung, the crepitation is found to be still less perceptible, and the sensation conveyed by pressing the parts is very like that produced by handling a pillow of down. On placing an emphysematous lung in a vessel of water, it sinks much less than a healthy lung, and sometimes it floats on the surface with scarcely any obvious immersion. The pulmonary tissue is drier in a lung affected with emphysema than in a healthy one, and it is unusual to find even towards the roots of the lungs any trace of the common serous or sanguineous infiltrations usually found after death."* In some cases, however, especially when the heart is diseased and the pulmonary circulation much obstructed, the emphysematous lung becomes red and congested.

It seldom happens that emphysema exists to the extent so admirably described in the preceding paragraph, without occasioning the rupture of several of the dilated cells, and it is by no means uncommon to find one or more

large vesicular cavities formed, each by the reunion of all the air-cells of one entire lobule, and bounded by its interlobular partitions, which often remain uninjured when the texture of the air-cells which they enclose is completely destroyed; in extreme cases these interlobular partitions give way likewise, and several lobules are then thrown into one large vesicular cavity, resembling more a bladder filled with air or the vesicular lung of a frog, than the parenchymatous texture of the human lung. These alterations are most frequently observed at the margin of the lung or at its base where it reposes on the diaphragm.

From these observations it results that emphysema of the lung essentially consists in the rarefaction of its parenchyma, produced either by the dilatation of its cells, or the rupture of their parietes. These lesions may be referred to three principal causes: 1. hypertrophy; 2. atrophy; 3. over-distension of the air-cells.

1. *Hypertrophy.*—Laennec has remarked that in several cases where the lung has been rendered incapable of performing its functions, the other, having double duty to perform, acquires an increase of volume proportionate to its increased activity of function. This increase of size appears to result from an increase in the capacity of the capillary bronchi and air-cells, at the same time that their parietes are increased in thickness; indeed, this is rendered very evident by inflating and drying the lung, for when after this process it is cut into slices, we at once perceive some cells much larger than in the natural state, and likewise their parietes much thicker than they usually are. The state of the air-cells in this form of emphysema may be considered as analogous to the hypertrophy with dilatation of the heart and other hollow muscles.

2. *Atrophy of the lung.*—Whenever any cause continues for a certain length of time to impede the free entrance of air into the pulmonary cells, those cells diminish in number, and the parenchyma of the lung falls into a state of atrophy. Accordingly, we find this atrophy invariably taking place in lungs which have been compressed by pleuritic effusions of long standing, or when the principal bronchial tube is compressed by external tumours. In old age, likewise, the lungs sometimes undergo so considerable a degree of atrophy that the chest is visibly contracted in consequence; and in such persons they are small, contain very little blood, are remarkably light, and their whole texture appears rarefied. If we inflate and dry a lung in this state, we perceive a remarkable alteration in the disposition of the ultimate bronchial ramifications, and of the air-cells in which they terminate; they no longer form distinct cavities, separated from each other by complete septa: at first these septa are only reduced to a state of extreme tenuity, but at a later period some of them appear perforated in one or more points, while others seem ruptured and irregularly torn. In some cases the walls of the cells disappear altogether, and we only find in their stead

* Forbes's Translation of Laennec.

some delicate filaments traversing in different directions cavities of various sizes. In the parts of the lung where these alterations exist, there are no longer to be found either bronchial ramifications, or air-cells, properly so called, but merely vesicles of greater or less diameter, divided into compartments by imperfect septa or irregular laminæ, bearing a perfect resemblance to the lungs of cold-blooded animals.*

Thus we see how lesions the most opposite in their characters, hypertrophy and atrophy, may alike produce this disease. But in the case of hypertrophy there is only dilatation of the cells without laceration of their parietes, unless as an accidental occurrence; whereas, in atrophy of the lung, large cavities are formed by several cells being thrown into one by the extenuation and rupture of their walls. Hence arises this important difference, that in the first case the number of surfaces on which the blood is exposed to the action of the air remains the same, while in the second the number of these surfaces is considerably diminished. It is easy to see that the respiration will not be equally affected in these two cases, and that the dyspnoea must necessarily be more considerable in the latter. There is, however, one circumstance that occurs in old age (at which period this alteration, as already stated, most generally occurs,) which prevents the respiration from being as much embarrassed as we might *à priori* have expected,—namely, the diminution that takes place in the quantity of the blood, or (what comes to the same thing) the diminution in the rapidity of the circulation. For this reason atrophy of the lung, when occurring in old age, should rather be regarded as a natural phenomenon resulting from the fulfilment of a law in the animal economy which establishes a constant proportion between the quantity of blood to be aerated in a given time, and the extent of surface on which this aeration is to be accomplished. Thus we find that the lung has its maximum of density in infants, and in those animals that have either a very rapid circulation or a very large supply of blood, and that, on the contrary, the density of the lung is at its minimum in old persons, and in such animals as receive into their lungs, at each round of the circulation, only a small proportion of the blood contained in their circulating system.†

Besides these, which may be considered as the physiological causes of pulmonary emphysema, there are others which produce a similar condition of the organ in a manner purely mechanical, by keeping the air-cells in a state of over-distention. Amongst these may be enumerated violent efforts of any kind (especially if often renewed) which cause the long-continued retention of the breath; repeated attacks of catarrh, bronchitis, asthma, or other diseases of the lungs or air-tubes, attended with difficulty of breathing, or distressing paroxysms of coughing.

The mechanism of the over-distention and rupture of the air-cells in these cases may be explained by the efforts which are constantly made by the powerful muscles of inspiration to introduce a fresh supply of air into the air-cells, while that which they contain is prevented from escaping by pellets of viscid mucus, spasmodic stricture of the bronchi, or turgescence of the bronchial membrane, according to the nature of the disease which produced the dyspnoea. In this way, the air-cells are kept in a state of over-distention which the efforts that are made to evacuate them only tend to confirm and increase; and provided the obstruction is of some continuance, the dilated condition of the cells will be rendered permanent, or else their parietes will give way, and allow several cells to be thrown into one.

From this view of the matter, it will readily be understood why all diseases accompanied by protracted attacks of dyspnoea, or violent and often repeated paroxysms of coughing, are so constantly followed by emphysema, especially when occurring in persons advanced in life, in whom, as we have already explained, the lungs are peculiarly predisposed to this disease by the atrophy which their parenchymatous texture naturally undergoes at this period of life. But though the over-distention and rupture of the air-cells is in general a slow process produced by long repeated efforts to overcome an obstruction to the free exit of their contents, and is consequently the result, in most cases, of some chronic affections of the bronchial tubes, such as dry catarrh, asthma, or the congested state of the mucous membrane, so frequently produced by organic lesions of the heart; it may likewise be produced in a very short space of time, when the efforts made by the muscles of respiration are violent and constantly repeated. We have frequently found the lungs emphysematous in children dying of whooping-cough; and in one instance, where the whooping-cough had not lasted longer than three weeks, we saw several cells dilated to the size of garden-peas, of a globular form, and with their parietes evidently hypertrophied.

From whatever cause the emphysema proceeds, its constant effect is to render the portion of lung affected incapable of performing its respiratory functions, as is evident from the absence of respiratory murmur in the part during life, and the difficulty with which the air escapes from the overstrained or ruptured cells, even after the lung has been removed from the body. Moreover, as the emphysema is in almost every instance originally produced by turgescence of the bronchial membrane, or spasm of the circular fibres, so from an effect it generally becomes a cause, and maintains the disease by which it was originally excited. Accordingly we find that persons labouring under emphysema of the lung are particularly liable to attacks of asthma and bronchitis, and, as a consequence of the latter, and of the efforts made during respiration, to hypertrophy or dilatation of the heart. These intercurrent diseases usually occur only after long intervals during the first

* Andral's Pathological Anatomy.

† Andral, Op. Cit.

years of the disease; but when the complaint is of long standing, and the patient is far advanced in life, the paroxysms become more frequent and more severe, each succeeding attack increases the extent of the organic lesion and rupture of the pulmonary tissues, and sometimes interlobular emphysema then ensues.

From these observations it may be concluded that pulmonary emphysema in a moderate degree is not a disease of great severity, and that the principal danger is to be apprehended from the repeated attacks of bronchial disease by which the emphysematous condition of the lung was originally produced, and to which, in its turn, it seems to act as a predisposing cause.

From the pathology of emphysema, its diagnosis and treatment may be easily deduced. The dyspnœa, which is its most constant symptom, depends in a great measure on the extent of the disease, and the age and constitution of the individual. When the emphysema is rapidly formed, occupies an extensive portion of the lung, and occurs in a young plethoric subject, through whose lungs a large quantity of blood is constantly in circulation, the dyspnœa which ensues may be so great as to terminate rapidly in asphyxia. But when, as is much more frequently the case, the emphysema commences slowly and proceeds gradually, the disease is in itself seldom attended with any immediate danger, although it renders the organ obnoxious to serious or even fatal effects from contingent pulmonary disease, which in a healthy lung might be borne with comparative impunity.

The difficulty of breathing which accompanies this disease is constant, but is aggravated by paroxysms, which are irregular both in the period of their return and their duration; it is likewise increased by all causes which usually increase dyspnœa from whatever source arising, such as the action of digestion, flatulence in the stomach or bowels, anxiety, living in elevated situations, strong exercise, running, or ascending a height, and above all by the supervention of an acute catarrh, to which, as already stated, persons affected with emphysema are peculiarly liable. Between the paroxysms there is no fever, and the pulse is generally regular. In slight cases the complexion and habit of body are little altered; but when the affection is more considerable, the skin usually assumes a dull earthy hue, with a slight shade of blue interspersed, and the lips become violet, thick, and swollen; there is likewise more or less of cough usually present, though it is sometimes so slight as to escape the notice of the patient: the expectoration generally consists of a greyish viscid mucus. These symptoms may, however, be considered as appertaining more properly to the disease of the bronchi with which the emphysema is complicated, than to the emphysema itself.

When the emphysema is confined to one lung, or is much greater in one than in the other, the side most affected is perceptibly

larger than the other, its intercostal spaces are wider, and it yields a clearer sound on percussion. If both sides are affected equally, the whole chest yields a very distinct sound, and, instead of its natural compressed shape, exhibits an almost round or globular outline, swelling out both before and behind: this conformation of the chest is sometimes so remarkable as to render the existence of the disease evident from simple inspection.*

The pathognomonic signs of this disease are furnished by a comparison of the indications furnished by percussion and auscultation; for while the sound elicited by percussing the chest over the part affected is perfectly clear, or even tympanitic, the respiratory murmur is extremely indistinct, or even completely extinct, and in its place a slight sibilous râle only is heard even during the forced inspirations that precede the act of coughing. These indications will be confirmed by the long continuance of the disorder, and the existence of an habitual dyspnœa, occasionally aggravated by asthmatic paroxysms.

When the disease is so far advanced as to form large vesicular cavities under the pleura, its presence may be recognised by a sound heard during inspiration or coughing, which is quite pathognomonic, and described by Laennec under the appropriate name of the *crepitous râle with large bubbles*. The sound of this râle he compares to that which would be produced by blowing into half-dried cellular membrane. We have repeatedly verified the accuracy of this comparison, and have uniformly found on dissection that the sound in question was produced either by an extreme state of vesicular emphysema, or by the interlobular form of the disease; we have often found these alterations on dissection in cases where this premonitory sound was never discovered.

There is another stethoscopic sound which Laennec describes as belonging exclusively to interlobular emphysema, but which we have heard on more than one occasion, in cases of vesicular emphysema where the ruptured air-cells projected above the surface of the lung. We allude to the "*friction of ascent and descent*," as Laennec terms it, which is a sensation or sound of one or more bodies rubbing against the ribs, and rising and falling during the alternate movements of inspiration and expiration. The friction of ascent takes place during inspiration, the friction of descent accompanies expiration, and is much more constantly audible than the other sound. Most commonly the friction seems to take place against the costal pleura; at other times it appears to have its site against the diaphragm or mediastinum, or between the lobes of the lungs. These sounds are sometimes accompanied by a crepitation perceptible to the hand.

Treatment.—As pulmonary emphysema must, in almost every instance, be regarded as

* Laennec, Op. Cit.

an *accident* caused by some prior disease of the lung, the first indication should obviously be to remove the original disease, as the most effectual means of removing its effect, or, at least, of preventing its farther extension. This is perhaps as much as we can reasonably hope to accomplish in this case, as it is difficult to conceive how any method of treatment should restore that portion of lung which has once become emphysematous to its original healthy condition. M. Laennec, however, is of opinion that this affection should not be considered as altogether incurable; and that, if we can diminish the intensity of the cause which keeps up the habitual distention of the cells, we may in the end hope that these will be actually lessened in volume. With this view the cause of the emphysema should be combated by prompt and active treatment, and the patient should be made to abstain from all the ordinary exciting causes of dyspnoea, as they not only produce present distress, but likewise keep up the over-distention of the cells, and consequently increase the extent of the emphysema.

It has already been stated that emphysema in a moderate degree is not a disease of great severity, and that it is from the supervention of attacks of asthma or bronchitis that the principal distress and danger are to be apprehended. Every precaution should therefore be adopted to remove these affections and prevent their recurrence.

To detail the treatment of these diseases here would be to repeat what has been stated in other parts of this work: we therefore refer the reader to the articles *ASTHMA*, *BRONCHITIS*, and *CATARRH*, for all the information that can be obtained on the subject in the present state of our experience.

Laennec recommends frictions with oil as useful in diminishing the susceptibility to be affected with catarrh; but a more effectual method of accomplishing this object is by sponging the chest every morning with vinegar and water, and afterwards dry-rubbing the part with flannel or a flesh-brush, as recommended in *ASTHMA*. In the case of pallid cachectic patients, the subcarbonate of iron has occasionally seemed to have a similar effect, and to tend at the same time to diminish the congestion of the mucous membrane, and also the spasmodic stricture of the bronchi. It is also of importance to attend to the state of the digestive organs, as experience has fully proved that irritation of the bronchial membrane is very often a sympathetic affection depending upon irritation of the stomach. Whatever, therefore, is improper for a dyspeptic patient should be avoided by those who labour under emphysema of the lungs. Warm clothing in all cases of delicate mucous membranes is particularly necessary, and flannel should be worn next the skin during the day, the lower extremities should be kept especially warm, and other necessary precautions adopted to guard against the cold of the winter months.

We have known many persons affected with emphysema of the lungs, and that to a very

considerable extent, whose breathing was quite good during the summer months, but who dreaded the approach of winter as the never-failing harbinger of their sufferings. For such cases the only alternative is to spend the winter in a more congenial climate. Indeed there is, perhaps, no class of complaints in which the beneficial effects of change of air and climate are more decidedly manifested than in those chronic cases of pulmonary emphysema complicated with great susceptibility of irritation in the mucous membranes of the air-passages.—(See *CLIMATE*.)

II. Interlobular emphysema.—This, as its name implies, consists in an effusion of air into the cellular tissue, which intersects the pulmonary parenchyma, and divides each lobe into a number of distinct lobules. This form of pulmonary emphysema may be easily recognised in the dead body, by the transparency of the interlobular partitions, which contrast strongly with the denser structure of the intervening portions of parenchyma. Instead of the scarcely perceptible thinness which they exhibit in the natural state, these partitions, in a state of emphysema, are distended to the breadth of two or three lines, or even of an inch in some cases. They are generally widest at the surface of the lung, where the distention of their delicate cells bears an apt resemblance to a string of glass beads. Sometimes the emphysema is confined to two or three interlobular partitions, which run parallel to each other from the margin of the lung; in some cases these parallel bands are intersected by transverse partitions likewise in a state of emphysema, and the lobules intercepted between these intersecting partitions are thus completely insulated, being surrounded on all sides by transparent cellular tissue in a state of emphysema.

When the disease continues to extend, the air passes from one interlobular partition to another until it reaches the root of the lung, from whence it soon extends to the mediastinum, and thence spreads all over the cellular tissue of the trunk.—(See the preceding article.)

It sometimes happens in this form of the disease that the air escapes into the cellular tissue which connects the pleura to the lung; in this way one or more bubbles of air are formed immediately under the pleura, and may be pushed along the surface of the lung by the finger,—by which circumstance they may be distinguished from the vesicles that are formed in the true pulmonary emphysema, as the latter are prevented from being displaced in this way by their interlobular partitions.

The formation of interlobular emphysema is explained by M. Laennec as necessarily depending on a rupture of some of the air-cells, and the consequent extravasation of the air contained in them into the cellular substance surrounding the lobules. It must, however, be admitted that, even in the most extensive cases of this disease, no such rupture has ever been detected, and that the rupture of several cells constantly takes place, and yet not a

particle of air finds its way into the interlobular partitions; nay, that these partitions may themselves be lacerated, and yet no interlobular emphysema be produced. Farther observations are required to elucidate this subject.

This form of emphysema is as rare as the other is common. It is very seldom combined with the true pulmonary emphysema; and in the great majority of cases seems to result from some sudden and violent effort of the respiratory muscles, as in the forcing pains of child-birth, in raising heavy weights, in hooping-cough, &c. Notwithstanding the greater density of their lungs, children appear to be more liable to this disease than adults.*

The only symptom from which the existence of this disease can be suspected, is the sudden supervention of dyspnoea after any violent effort of the lungs. Its stethoscopic signs are the dry crepitous râle with large bubbles, and the friction of ascent and descent already described. These sounds, it will be recollected, are likewise common to the vesicular form of emphysema when the pleura is projected by several air-cells thrown into one; perhaps the only method of distinguishing between these cases is by the sudden supervention of the dyspnoea and of the stethoscopic signs in the interlobular form of the disease: fortunately, however, the diagnosis is not a matter of much practical importance, as in the slighter cases (in which alone any ambiguity can exist) the air appears to be always absorbed, and the interlobular partitions gradually return to their natural state. When the aerial infiltration extends to the external parts, the difficulty of diagnosis is at once removed, and the disease may be treated on the principles already stated in the preceding article on general emphysema.

(R. Townsend.)

EMPHYEMA. *Ἐμπίημα*, formed of *ἐν* and *πύον*, literally signifies an internal collection of pus, and in this general sense was employed by several ancient authors. By subsequent writers its signification has been considerably restricted, and nosologists now apply the term exclusively to those collections of pus which are contained within the sac of the pleura. In practice, however, it is not always easy to determine, *a priori*, the precise nature of the fluid collected within the chest, as its physical characters are found to vary considerably, even in those cases that most closely resemble each other in their origin, progress, and symptoms. In a case of empyema of two months' standing, occasioned by the bursting of a tuberculous abscess of the lung into the pleura, the effusion, as observed by the writer, presented all the characters of genuine pus; while in another case, where the pleuritic effusion was produced by a similar cause, and assumed the same chronic form, the operation of paracentesis gave issue to a fluid as transparent and colourless as water.

Other varieties, to be presently enumerated, have likewise been observed in the appearance and composition of these fluids; and as there are no peculiar symptoms by which we can always discriminate their precise nature during the lifetime of the individual, the term is now generally used without any reference to the puriform character of the effusion.

When effusion into the thorax takes place in an individual of a dropsical diathesis, and seems to result from an obstruction to the circulation and the consequent transudation of the serous part of the blood, rather than from any irritation of the secreting surface, the disease is denominated *hydrothorax*. When the effusion is known to consist of blood, as in penetrating wounds of the chest, where the pulmonary or intercostal vessels have been injured, the term *hæmothorax* is used to express it; and the name of *pneumothorax* is applied when the effusion is of a gaseous nature. With these exceptions, all cases of effusion into the pleura that are sufficient to compress the lung and impede the function of respiration, are comprehended under the generic appellation of *empyema*.

The pleura, like other serous membranes, constantly exhales a fluid, in the form of vapour, by which its surface is lubricated and moistened. In the natural state, this perspiratory fluid always exists in the form of halitus or vapour; but in a morbid state, it is sometimes exhaled in much larger quantities, and instead of vapour assumes the fluid form. Its qualities are then also materially altered, so that, instead of a slight moisture barely sufficient to facilitate the gliding motion of the opposing surfaces on each other, the serous sac is filled with certain morbid secretions, of which the following are the principal:—

1. Serum: its composition is sometimes the same as that of the blood, and sometimes differs from it in containing a greater or less proportion of albumen.
2. The same combined with a certain quantity of the colouring matter of the blood.
3. Pure blood.
4. Pus.
5. The spontaneously coagulable and organizable matter of which false membranes are formed, and which, in their turn, are liable to undergo various morbid alterations: thus they may become inflamed and form new false membranes, or exhale blood, or secrete pus, melanosis, or tubercle; or lastly they may be transformed into fibrous, cartilaginous, or osseous tissue.*

These morbid productions, either singly or variously combined, form the principal, if not the only ingredients in all cases of pleuritic effusion.

Our knowledge of the pathology of pleuritic diseases in general, and of empyema in particular, has been considerably advanced of late years by the labours of Laennec, Broussais, and Andral, whose works, (*Traité d'Auscultation Médiate, Histoire des Phlegmasies*

* Laennec.

* Andral, Anatomie Pathologique.

Chroniques, Clinique Médicale.) contain the most complete history we possess of these diseases, and may indeed be said to form a new era in the pathology of this class of affections.

The effusion of empyema, it is now generally admitted, is in all cases principally, if not entirely, formed by a morbid secretion from the pleura, and may in almost every instance be referred to inflammation of that membrane, either in an acute or chronic, an evident or latent form; and even in those cases where pus or other matter is introduced into the pleura from an extrinsic source, as from the rupture of a pulmonary or hepatic abscess, the collection of fluid which constitutes the empyema consequent thereon, does not consist so much of the matter of the abscess as of the morbid secretion from the pleura which the irritation caused by the presence of that matter produces.

The nature of the exudation in acute pleuritis, and the successive stages of its organization and conversion into false membrane, are detailed in a separate article in this work. (See PLEURITIS.) For our present purpose, it is only necessary to consider those morbid secretions of the pleura which evince no disposition to become organized or absorbed, but continue to accumulate in the shut sac of that membrane, where they act as a foreign body, and, by their pressure on the important organs contained within the parietes of the chest, present a constant obstacle to the due performance of their functions.

In some cases the effusion consists of a clear, transparent, or lemon-coloured serum; sometimes the effused fluid, though it still retains its transparency, contains several floculi of albumen, some suspended and others precipitated to the bottom. More frequently it is rendered quite turbid by the quantity of these minute floculi that are partially dissolved and suspended in it, while the pleura, more especially the most dependent portion of it, is covered with an inorganic layer of a white or yellowish paste formed by these floculi, which fall in the form of a sediment to the bottom of the fluid in which they were suspended. In other cases, and they are by far the most numerous, the effusion is still more turbid, and of a greyish brown or yellow colour—in short, it exhibits every intermediate variety of appearance until it presents all the characters of genuine pus.

These different varieties of effusion are sometimes mixed up with the contents of abscesses formed in the neighbouring parts, as in the lungs or liver, and discharged into the pleura. In some cases the effusion is coloured by the admixture of a certain quantity of blood, and in some rare instances the effusion has been found to consist entirely of blood. This sanguinolent effusion sometimes occurs at the very onset of the pleuritic attack, constituting the *primitive hemorrhagic pleurisy* of M. Laennec, but is more frequently observed to occur at a more advanced stage of pleurisy, particularly at the time when vessels begin to be formed in the false membranes,

or when a fresh attack of inflammation supervenes in them. Much importance was attached by the older writers to the decomposition of these effusions and their tendency to putrescency; but the best pathologists are now agreed that they never acquire an offensive odour, or exhibit any sign of decomposition unless when the parietes which enclose them become gangrenous, or when a communication has been established between the fluid and the external atmosphere.*

The quantity of these effusions is sometimes so very great as to compress the lung into the smallest possible compass, and exhaust it of its air more effectually than could be done after death by means of an air-pump; at the same time the parietes of the chest which are in any degree susceptible of motion are distended to the utmost; the ribs are elevated, and their lower margins everted, so as to increase their capacity as much as possible; the intercostal spaces are protruded; the diaphragm is forced down into the abdomen, and the abdominal viscera are consequently displaced, especially the liver, which, in cases of extensive empyema of the right side, has been known to descend into the iliac fossa.† The mediastinum, in like manner, yields to the distending force of the effused fluid, compresses the opposite lung, and allows the heart to be thrust completely out of its natural situation. We shall presently see that this displacement of the heart is one of the most constant and least fallible symptoms of empyema. Without this great enlargement of the affected side, it would be physically impossible that one sac of the pleura could accommodate such an enormous quantity of fluid as has occasionally been found there.

A patient of Dr. Croker, of Dublin, was lately operated on for empyema by Mr. Crampton, when the almost incredible quantity of fourteen imperial pints of pus was drawn off from the left pleura. In Dr. Archer's case of successful paracentesis of the thorax, recorded in the second volume of the Transactions of the Dublin Association, eleven pints of an inodorous fluid were drawn off, and in a few weeks after the patient was quite convalescent. Many other instances might be quoted of effusions equally great, or even still more extensive.

When the effusion is removed, it seldom happens that the pleura is exposed to view, as its surface is almost invariably covered with a coating of adventitious matter, which gives the interior of the chest much more the appearance of the walls of a large abscess than of a cavity lined with serous membrane. When, as in cases of latent pleurisy, the pleura is covered with a layer of the inorganic sediment, which is deposited when the effusion is wholly puriform, the layer of matter may be scraped off with the handle of the scalpel, and then the membrane underneath presents

* Andral and Broussais, Op. Cit.

† Stoll, Ratio Medendi.

an opaque blueish appearance, as if caused by the maceration to which it had been so long submitted. A few red dots or striae, as if laid on with a pencil, are generally dispersed over its surface; the membrane itself is seldom if ever really thickened, its apparent thickening being in almost every instance caused by a coating of adventitious membrane, which had been exuded during the earlier stages of the inflammation. When the chronic pleurisy succeeds to an acute attack, this apparent thickening of the pleura is a very constant appearance: sometimes the adventitious membrane forms a delicate transparent pellicle which appears perfectly incorporated with the subjacent membrane, but may however be dissected from it in one or more layers; sometimes the pleura is closely studded with minute transparent or opaque granulations of a flattened form, but most frequently the adventitious coating is of an opaque whitish colour, and varies in consistence from curd or soft cheese to fibro-cartilage, to which substances it often bears a very strong resemblance; and as it is generally composed of several strata laid one over the other, it sometimes forms a dense solid layer many lines or even inches in thickness. When a coating of this description is developed on the pulmonary pleura, it forms such an unyielding envelope round the lung in its compressed, contracted state, as must effectually prevent its expansion when the pressure of the fluid is removed; and as the lung in this condition cannot dilate itself promptly enough to keep pace with the progress of absorption, when the disease terminates favourably, the parietes of the chest must necessarily fall in to occupy the space left by the removal of the fluid: in this way is produced the *contraction of the chest* which so constantly follows the removal of a chronic effusion from the pleura either by absorption or evacuation.

The adventitious membranes which line the pleura are liable to a variety of morbid alterations; they are evidently susceptible of inflammation, and likewise of ulceration; for in many cases they have been observed eroded, as it were, with small circular pits, sometimes shallow and sometimes penetrating through the whole thickness of the false membrane: occasionally these penetrating pits communicate with each other by sinuses, or by a more extensive separation of the false membrane from the subjacent pleura, but at other times the ulceration penetrates through the pleura itself. When this happens on the costal pleura, it sometimes gives rise to the formation of external tumours, which either burst externally and discharge the matter of the empyema, or else form one or more sinuous passages by which the pus is infiltrated into the subcutaneous and intermuscular cellular tissue; but when it takes place in the pulmonary pleura, a communication is eventually formed with a bronchial tube, through which (according to the position of the body at the time) part of the fluid escapes, or air enters. Several cases illustrative of these morbid appearances

are recorded in Dr. Duncan's interesting essay on empyema and pneumothorax in the 28th volume of the Edinburgh Medical Journal. The pleura and its adventitious coating of false membranes is likewise subject to gangrene, and the detachment of the gangrenous eschars sometimes serve, as in the case of simple erosion just noticed, to form an outlet by which the matter of the empyema is evacuated.

These false membranes are likewise liable to other morbid changes. Sometimes they are transformed into fibrous or cartilaginous tissue, and in some instances they have been found completely ossified; they are also liable to the development of various morbid productions, particularly tubercle. The tubercles that are formed in false membranes are generally small and very numerous. We have, however, once or twice seen tubercles as large as filberts, in the adventitious coating of the pleura; their development is usually a slow process, and generally occurs in cases of very chronic pleuritis; but sometimes they are generated in great numbers with an extraordinary rapidity. M. Andral has seen the false membranes studded with tubercles in persons who died of acute pleuritis of only fifteen days standing.*

The morbid alterations which we have described may exist in both sacs of the pleura at the same time, constituting the double empyema of authors, or, as much more commonly happens, may occupy one side of the chest; or, lastly, may be limited to a part of one side. When the inflammation is limited to a certain extent of the pleura, the effusion is generally circumscribed by adhesions which prevent its creeping into the general sac of the pleura; these circumscribed empyemas, as they are termed, may exist between the lower lobe of the lung and the diaphragm, or between two contiguous lobes, between the inner surface of the lung and the mediastinum, or between any part of its outer surface and the costal pleura. Not unfrequently there exist between the pleura costalis and pulmonalis a number of dense firm adhesions, which, like so many shelves or partitions, intersect the effusion, and divide the sac of the pleura into a number of distinct compartments. We examined the body of a patient who died of empyema in the Whitworth Hospital, in March 1830, in whom the effusion was divided by these partitions into three compartments, so perfectly distinct from each other, that had the operation of paracentesis been performed during life that compartment only could have been evacuated into which the incision had been made; so that in order to draw off the entire effusion, it would have been necessary to perform three several operations.

The effect of the effusion in compressing the lung and diminishing its volume, has already been alluded to. When the effusion is very extensive, the lung becomes flattened and

* Clinique Médicale, vol. ii.

completely flaccid, and its surface corrugated like the shrivelled rind of a withered apple; in this state the pulmonary tissue is soft, pliant, and dense, like a piece of skin, without any crepitation, more pale than natural, and almost entirely without blood; its blood-vessels are flattened and frequently appear quite empty.* The lung thus circumstanced is incapable of expanding for the admission of air so long as the fluid continues to press on its surface: its alveolar texture, however, continues very distinct; and, when its surface is not coated with an unyielding false membrane, it may be readily restored to its full dimensions by inflation. The usual position which the lung thus compressed occupies, is by the side of the spinal column, against which it sometimes lies so close as to have escaped the observation of several distinguished anatomists, who accordingly described it as totally destroyed by suppuration. Its position may, however, be materially altered by adhesions attaching it to different points of the thoracic parietes, and preventing its receding from them. We have known the lung retained in close contact with the whole anterior part of the chest, while the fluid was accumulated in the posterior part. Andral records a case of empyema, in which the upper and middle lobe of the right lung were retained in their natural position by adhesions, and formed a complete roof over the effusion, which filled the whole of the lower part of the chest.† Drs. Graves and Stokes relate two remarkable cases of empyema in the fifth volume of the Dublin Hospital Reports, in both of which the lungs were attached from their apex to their basis by a vertical adhesion of about two inches in breadth. Other observations might be adduced illustrative of the effects of adhesions in preventing the lungs receding from the parietes of the thorax; but for our present purpose it is sufficient to remark that, as there is no part of the pulmonary pleura which may not contract adhesions with the corresponding surface of the costal pleura, so there is no part of the chest with which the lung may not be retained in contact, even in cases of very copious effusion. The knowledge of this anatomical fact is, as we shall presently see, of considerable importance in some cases for determining the presence of empyema, and likewise for selecting the site of the operation of paracentesis.

The lung, when compressed in the manner we have described in the preceding paragraph, is seldom attacked with inflammation; indeed its exanguineous condition would seem to guarantee it sufficiently from attacks of that nature; but there is another morbid alteration which the lung under such circumstances frequently presents, namely, the development of tubercles. M. Broussais supposes that their formation is in most cases consequent to the effusion, and in a great degree, if not altogether, produced by the obstruction of the

lymphatic circulation in the part.* A more general opinion however is, that tubercles are in this, as in other cases, the result of a general diathesis, and had probably existed in the lung before the effusion had taken place. M. Broussais's opinion, if correct, would furnish a strong argument in favour of operating at an early period of the effusion, in order to anticipate, if possible, the formation of the tubercles. Another morbid appearance which the lung occasionally presents is the formation of a gangrenous or phlegmonous abscess, by which, when the pleura is perforated, the effused fluid finds a passage into the bronchi, and is expectorated.

Such are the principal morbid appearances that have been observed after death in cases of empyema: it now remains for us to investigate the causes of these anatomical lesions, and to consider the symptoms to which they give rise, and by which they may be distinguished during life. We shall thus be prepared to form a correct estimate of the progress and termination of this disease, and of the remedies best calculated to arrest its progress and remove its effects.

We have already seen that the matter of empyema is in most cases formed exclusively by a morbid secretion from the pleura, and that, even in those instances where pus or other matter is introduced into the pleura from the rupture of an adjacent abscess, the empyema which follows is principally formed by exhalation from the inflamed pleura. It may, therefore, be assumed that inflammation of the pleura is the proximate cause of empyema. As, however, the ordinary course of pleuritic inflammation is not to terminate in empyema, but in the exudation of a compound fluid, the serous portion of which is subsequently absorbed, and the solid part organized and converted into false membrane, it becomes a question to determine what are the circumstances that cause the inflamed pleura to secrete the inorganic matter of empyema rather than the ordinary organizable product of pleurisy, or, in other words, what are the species of pleuritic inflammation which have the greatest tendency to terminate in empyema.

These may be divided into four classes:

1. Acute pleuritis of intense violence.
2. Acute pleuritis degenerating into the chronic form.
3. Inflammation of the pleura of so low a type as not to present the ordinary symptoms of acute pleurisy.
4. Pleuritis caused by the introduction of foreign substances.

1. *Acute pleuritis of intense violence.*—It very rarely happens that inflammation of the pleura is so intensely violent as to induce gangrene. When it does occur, a copious effusion always follows. More frequently, when the pain and other inflammatory symptoms present an unusual degree of violence, blood is effused from the inflamed surface; generally speaking, the effusion of fluid is more abun-

* Laennec, Op. Cit.

† Clinique Médicale, vol. ii.

* Op. Cit. vol. i. p. 343.

dant in the hemorrhagic than in the simple pleurisy, and the tendency to absorption is much less.* Lastly, when the pleuritis assumes this violent intractable character, a copious secretion of puriform matter may take place at an early stage of the disease. In a young woman who died in the Hardwicke Fever Hospital in the year 1826, after experiencing for twelve days before her death the symptoms of most violent inflammation of the pleura, we found, on dissection, nine pints of thick inodorous pus in the right pleural sac. M. Andral records another case in which a purulent effusion was formed with equal rapidity. Although the inflammatory symptoms were combated from the very outset of the disease by the most active treatment, on the fifth day the whole of the right side sounded dull on percussion, and respiration had ceased to be audible there; on the seventh, the side was evidently dilated; and on the eleventh, when the disease terminated fatally, the right side was found, on dissection, so filled with pus that the lung was completely condensed and flattened against the spine.† Piso likewise relates several cases of acute pleuritis, in which the patients died on the fifteenth, and some even so early as the ninth day, *with their sides full of pus.*‡ In those acute cases of empyema, the diagnosis is never difficult; the extreme violence of the symptoms, the acute pain of the side rendered almost insupportable by coughing, the excessive dyspnoea, general anxiety, and high fever, at once point out the highly inflamed state of the pleura, and awaken our attention to the possibility of its terminating by effusion: when under such circumstances the physical signs of effusion (to be presently described) rapidly supervene, the existence of empyema is placed beyond a doubt. This acute form of empyema is, however, much more rare than those chronic forms of the disease we are next to consider.

2. *Acute pleuritis degenerating into the chronic form.*—In the greater number of pleurisies which terminate favourably, the process of the absorption and organization of the effusion is completed within a limited period, which, at an average calculation, may be estimated at three weeks or thereabout.§ Whenever the symptoms of pleuritic inflammation outlast this period, or when, after a temporary abatement of the inflammatory symptoms, the patient is seized with rigors and irregular febrile paroxysms similar to those of remittent fever, there is reason to fear that the disease is about to assume the chronic form, and empyema may be apprehended. In many cases the passage of the disease from the acute into the chronic form may be traced to the circumstance of its having been neglected during its earlier stages, or not combated by sufficiently active treatment, or else to some indiscretion on the part of the patient during conva-

lescence, particularly in the article of diet; but we likewise meet occasionally with cases of acute pleurisy, which, however actively and judiciously treated, inevitably degenerate into the chronic form. M. Broussais, whose opportunities of observation in this matter have been most extensive, states, as the result of his experience, that acute pleurisy passing into the chronic form is decidedly the most frequent cause of empyema. Whenever, therefore, the symptoms of pleuritic inflammation outlast their ordinary period, and are succeeded by those of effusion, we have the strongest evidence of the existence of empyema, inasmuch as the symptoms of empyema make their appearance under those circumstances which most frequently lead to such a termination.

3. *Inflammation of the pleura of so low a type as not to present the ordinary symptoms of acute pleurisy.*—Several physicians of the last century, and particularly Stoll, had remarked that, in many cases of pleurisy, the stitch which commonly attracts attention to the character of the disease, is altogether wanting, and that the insidious mildness of the whole symptoms in the early stage is such as not even to excite any suspicion of a severe affection. This latent form of pleurisy is essentially chronic in its progress. At no period of its course does it present the intense fever, severe pain, or energetic reaction, which characterize an acute disease. It seldom occurs in persons of good constitution, but usually attacks those who have become cachectic from some cause or other, especially persons of a strumous habit.* There are, however, certain exciting causes, which are said to have a peculiar tendency to generate this latent form of pleurisy, amongst which may be enumerated contusions of the chest, wounds of the pleura, the cold stage of ague, and metastasis of rheumatism. These causes, says M. Broussais,† most commonly give rise to pleurisies that are latent in their origin and chronic in their progress. Effusion of puriform matter may likewise take place into the pleura from other causes, and without being preceded by the ordinary symptoms of pleuritic inflammation. A case of latent empyema, consequent on venous inflammation, lately occurred in the Meath Hospital, under the care of Mr. Porter. The patient, a stout young man, in the course of a few days, after having been bled, was seized with symptoms of phlebitis, and diffuse inflammation of the cellular membrane extending along the arm to the axilla. The disease proved fatal, and on dissection, in addition to the morbid appearances of the diseased limb, the pleura of the same side was found to contain several quarts of pus. In this case, no symptom whatever was observed during life to excite any suspicion of the pleura being the seat of disease. We have also known the amputation for white swelling followed in two instances by copious depositions of pus in the pleura, and in neither

* *Laennec*, Op. Cit. Dr. Forbes's Translation.

† *Clinique Médicale*, vol. ii. case 13.

‡ *De Affect. a Seros. Colluv. ortis*, sect. iiii. cap. ix.

§ *Broussais*, Op. Cit.

* *Laennec*, Op. Cit. Dr. Forbes's Translation.

† Op. Cit.

case was there any symptom to indicate disease of that membrane. Several similar cases have appeared lately in the French journals of severe operations, especially those for the removal of suppurating parts, being followed by extensive depositions of pus in the interior, and on the surface of different organs.* In these and similar cases, it is probable that the depositions of pus are formed independently of any inflammatory process in the tissue where they are collected, or, to use the expression of M. Andral, "that the pus is first taken into the circulation, and subsequently separated from the circulating fluid, just as mercury, when injected into a vein, is found to deposit its globules in different parts of the body."†

Whatever the cause of the latent character of the disease may be, experience has fully proved that in a considerable proportion of the deaths from empyema, no symptom of pleuritic disease had been observed until the effusion was fully formed; for which reason the diagnosis of this form of empyema is often very obscure.

4. *Pleuritis caused by the introduction of foreign substances.*—Foreign bodies may be introduced into the pleura either through the lung or through the parietes of the chest. Amongst the former may be enumerated the contents of tuberculous, pneumonic, or gangrenous abscesses, or of pulmonary apoplexy bursting through the pleura. Of these the rupture of a tuberculous abscess is beyond all comparison the most frequent in its occurrence. Within the last four years no fewer than eighteen cases of empyema, with pneumothorax from this source, have come under our own observation, fifteen of which were verified on dissection, and we have heard of several other cases occurring in the hospitals of Dublin. The rupture of a pneumonic abscess was supposed, by the older anatomists, to be the most prolific source of empyema; but the researches of modern pathologists have ascertained that the formation of a pneumonic abscess is in itself an exceedingly rare occurrence, and its bursting into the pleura an event still more rare. The rupture of a gangrenous abscess, though of somewhat more frequent occurrence, must nevertheless be considered as an extremely rare cause of empyema. M. Laennec records a case of pleurisy and pneumothorax consequent to the discharge of a gangrenous abscess of the lungs;‡ and he alludes to another case in which a gangrenous eschar made its way into the pleura, determining a pleurisy which lasted fifteen months.§ Andral likewise relates a case of pleuritic effusion produced by the bursting of a gangrenous abscess.|| More commonly, however, the gangrenous affection

proves fatal before sufficient time has been allowed for the formation of empyema. In all these cases, the rupture of the lung and its investing membrane not only pours into the pleural sac the contents of the abscess, but likewise allows the air to enter at each inspiration, (see PNEUMOTHORAX;) and this elastic fluid, by compressing the lung at the same time that it irritates the pleura, produces an effusion which seldom terminates in adhesion, as the lung is, by the surrounding stratum of air, compressed against the spine, and thus prevented from coming in contact with the parietes of the chest. The bursting of pulmonary apoplexy into the pleura has, we believe, only been known to occur in four cases, and in each of these the accident was instantaneously fatal. (See PULMONARY APOPLEXY.)

Various substances may likewise find their way into the pleura through the parietes of the chest, and by their presence give rise to empyema. Abscesses of the liver have been known to burst through the diaphragm into the pleura. A case of this kind is recorded by Morgagni,* and another example of this morbid lesion is detailed in the *Journal de Médecine*.† These may, however, be regarded as very rare cases; for when an hepatic abscess takes this direction, the inflammation which precedes its progress generally produces an adhesion between the lung and diaphragm, which prevents the escape of the matter into the pleura, and directs it into the interior of the lung, from whence it may be expectorated through the bronchi: two specimens, exhibiting this course taken by abscesses of the liver, are preserved in the museum of the Whitworth Hospital. Abscesses formed in the walls of the chest may likewise burst into the pleura, though, like those of the liver, they more frequently open directly into the lung, or point externally, and suppurate on the surface. But in order to obviate the risk of their breaking internally, the safest plan is to make an early opening and let out their contents. The importance of this practical rule is well illustrated in an interesting case related by Dr. Duncan, in the first volume of the *Médecino-Chirurgical Transactions of Edinburgh*, in which the disease having commenced by the formation of an abscess in the parietes of the chest, and no external opening having been made, the pus eroded the pleura costalis, entered the cavity, excited chronic pleuritis, and at last found an exit through the lungs by a bronchial tube, establishing a communication between the aerial passages and the external tumor. Other remarkable examples of the danger of allowing these abscesses to burst internally are recorded by Sabatier;‡ and by De Haen, in his *Ratio Medendi*. Hemorrhage into the thorax from wounded vessels is not unfrequently followed by empyema, and extraneous substances introduced through penetrating wounds of the chest, such as spiculæ

* See *Recherches sur certaines Altérations qui se développent à la suite des blessures ou des opérations*, par M. Marechal, in 4to. 1828.

† Andral's *Pathological Anatomy*, vol. i. p. 503.

‡ Case 15, op. cit.

§ Ib. 227.

|| Op. cit. vol. ii. p. 433.

VOL. II.

* *Epist.* xxiv. No. 4.

† *Tom.* iii. p. 47.

‡ *Médecine Opératoire*, tom. ii. p. 124.

of bone, bullets, pieces of wadding, clothes, &c., by their presence in the pleura give rise to inflammation, which sometimes terminates in empyema, but more frequently in the exudation of organizable matter, which forms an investment round the foreign substance, and limits its effects to the spot where it is immediately situated.*

Such are the principal lesions that usually precede the formation of empyema. We would here observe, that a knowledge of the antecedent disease and of the symptoms preceding the effusion is often as essential towards forming a correct diagnosis of empyema as a knowledge of those symptoms which denote that the effusion has actually taken place, since the distinctive characters of the affection are often more strongly marked during its earlier stages than at its termination. Thus it frequently happens that a patient presents a train of symptoms which may be referred either to hepatization of the lung or effusion into the pleura; and so closely do the symptoms and physical signs of those affections resemble each other, that it is frequently impossible to distinguish between them so long as we confine our attention to the symptoms actually present; but if, on referring to the preceding history of the case, we find that the present symptoms were preceded by those of acute pleurisy subsequently degenerating into the chronic form, the difficulty of diagnosis is at once removed: unfortunately, however, the symptoms which precede effusion are in some cases as obscure as those which attend its actual formation, and hence arises the principal difficulty in detecting the presence of empyema.

Diagnosis.—The diagnosis of empyema has been most materially improved of late years. Laennec's happy application of the principles of mediate auscultation to the diagnosis of thoracic diseases has added a new and valuable set of physical signs to the symptoms of this disease previously known; and the researches of modern pathologists, by reducing those symptoms to their precise signification, and assigning to each its just value as a distinctive character, have rendered the diagnosis of empyema as remarkable for accuracy and precision as it formerly was for error and obscurity.

Of the symptoms hitherto enumerated by nosologists as characteristic of this disease, such as "fixed pain in the chest, breathing laborious but easiest in the erect position, difficult decumbiture on the sound side, fluctuating enlargement of the side affected, and dry tickling cough,"† almost all are common to it with other affections, and even of these equivocal symptoms the greater number are frequently wanting. Under such circumstances it is scarcely to be wondered at if the disease was constantly mistaken, or its very existence overlooked, of which so many examples are

recorded in medical literature that the only difficulty lies in the selection.

From a survey of the recorded cases of empyema and from our own observation, it is evident that, as empyema may exist without its characteristic symptoms, so these symptoms may exist without empyema; of which fact, indeed, the annals of surgery furnish but too convincing proofs in the numerous cases where the operation for empyema has been performed, but where no empyema existed. A remarkable case of this kind is recorded by M. Baffos, in his inaugural dissertation *sur l'Empyème* printed in Paris in 1814. A patient in one of the principal hospitals of that city presented a combination of symptoms which was supposed to demonstrate so unequivocally the presence of empyema that the operation of paracentesis was performed, but to the surprise of the operator no fluid was found; however, as the existence of empyema seemed indisputable, it was resolved in consultation to make an incision into the pleura of the opposite side; the second operation was attended with no better success than the first—not a drop of fluid followed the incision into either pleura. Dionis relates a similar occurrence in the case of the Duke de Montemart, who was operated on for empyema, which he had not; and he mentions another case in which a similar mistake cost the patient his life.* Willis likewise notices the occurrence of such mistakes: "Novi enim (says he) in aliquibus thoracis paracentesin et frustra et non prorsus innoxie celebratam fuisse."†

These examples may serve to show the uncertainty which formerly prevailed in the diagnosis of empyema, and the fatal results which too often followed these errors of diagnosis: it is needless to make any additional observations to point out the great practical importance of the improvements which have lately been made in this department of medical science, by which we are now enabled to detect the existence of this disease in every case where its diagnosis is a matter of practical utility.

The following symptoms and physical signs are those most characteristic of empyema, and when they are all combined, may be considered as quite pathognomonic:—Difficult respiration, increased by motion or exertion of any kind, and considerably aggravated by lying on the sound side; a sense of fulness and oppression in the chest, amounting in some cases to a sense of suffocation; enlargement of the diseased side; protrusion of the intercostal spaces, with obscure sense of fluctuation and œdema of the integuments; dulness of sound on percussion, and absence of the respiratory murmur in the diseased side, which remains perfectly motionless; puerile respiration in the opposite lung, accompanied with violent action of the respiratory muscles; displacement of the heart; descent of the diaphragm and consequent protrusion of the abdomen: to these characteristic marks may be added harassing short cough,

* Sec, on this subject, Hennen's Military Surgery, and Baron Larrey's *Mémoires*.

† Good's Study of Medicine, vol. ii. p. 264.

* Dict. des Sciences Médicales, art. *Empyème*.

† Opera omnia; de *Empyemate*, p. 97.

small rapid pulse, flushed cheeks, and other symptoms of hectic fever.

From this combination of symptoms, especially when they have been preceded by those of inflammation of the pleura, the existence of empyema may be certainly inferred. It is, however, to be remarked, that several of these symptoms vary considerably, according to the extent of the effusion, and even in those cases where the quantity of effusion is the same, according to the date of its formation. Thus, when the effusion is rapidly formed, the difficulty of breathing is extreme, the accompanying fever intensely violent, and the anxiety and dread of suffocation urgent and unceasing; but as the disease continues, these symptoms often assume more of a chronic character; the dyspnoea gradually diminishes, and is perhaps only perceptible after exercise or taking food; the fever likewise disappears, or is only perceptible towards evening; and the patient, encouraged by this abatement of the symptoms, complains only of weakness, and anticipates the speedy restoration of his health and strength. But if the physical signs of the disease be had recourse to, it will be found that this alleviation of symptoms is altogether illusory, and that the disease, instead of receding, has been steadily advancing.

As, then, the most characteristic symptoms of this disease are liable to considerable modification, and as several of them are occasionally wanting altogether, it may be worth while to examine each symptom separately, to consider how it is produced, what it signifies, and what is the precise relation it bears to the disease. We shall thus understand the just value of each, and see how far the existence of empyema is proved in the affirmative by its presence, or in the negative by its absence; for, as it is impossible to describe every variety of combination which the symptoms of empyema may present, the only alternative is to enable the physician, by acquainting him with the precise import of each symptom individually, to form his opinion of their signification collectively in whatever form of combination they may present themselves.

1. *Dyspnoea*.—The difficulty of breathing experienced in this disease is generally proportionate to the degree of pressure which the lung sustains, or, in other words, to the quantity of the effusion. To this general rule there are, however, numerous exceptions; indeed there is scarcely an author who has treated of this disease that does not recount instances of patients labouring under such extensive effusion as to compress the greater portion of one or even of both lungs, whose respiration was nevertheless not in the least affected.* We must not, however, suppose that the aeration of the blood is as perfectly accomplished in those cases as when both lungs are in the free exercise of their functions, for experience has shown that sooner or later these patients lose their flesh and strength, and their lives eventually fall a sacri-

fice to the disease. Experience has shown that the difficulty of breathing is extremely urgent when the empyema is formed rapidly, but that in more chronic cases the dyspnoea is generally proportionate to the violence of the fever, and the quantity of the effusion. Some individuals, however, have their breathing much more easily affected than others, and accordingly, under apparently similar circumstances, the dyspnoea continues extremely urgent in some from the commencement of the disease to its termination; in others, the respiration is at first greatly affected, but the dyspnoea gradually diminishes, and recurs only at intervals when the circulation is excited; whilst, in a third set, the respiration continues apparently unimpeded from the beginning to the end of the disease.* For these reasons, and as, moreover, the symptom of dyspnoea is common to almost every affection of the lungs, it can only be used in the diagnosis of empyema as corroborative of other less equivocal symptoms.

2. *Decumbency*.—The difficulty which patients affected with empyema experience from lying on the sound side has been noticed by all writers on the subject since the time of Hippocrates. The cause of this symptom, which by many is considered as quite pathognomonic, has been differently explained by authors. Le Dran ascribes the sense of suffocation, produced by turning on the side opposite to that in which the collection of pus is situated, to the mediastinum being on a sudden loaded with an unusual weight of fluid.†

M. Richerand, on the other hand, made several experiments, by producing artificial hydrothorax, to prove that fluid contained in one side of the chest could not, by its gravitation, displace the mediastinum, or exert any pressure on the organs contained in the opposite side, and hence argued that the difficulty of lying on the sound side arises not from the pressure of the incumbent fluids, but from the obstruction to the dilatation of the sound side, produced by placing it under the weight of the body.

In opposition, however, to this ingenious reasoning, we have direct proof of the influence of the weight of the fluid; for we find that in cases of pneumothorax with empyema, the patient can generally lie on the sound side so long as the effusion is principally gaseous; but as the proportion of ponderable fluid increases, decumbiture on the sound side becomes impossible. In like manner, in cases of empyema the dyspnoea is in general greatly aggravated by lying on the sound side; but when the fluid is evacuated, the patient is immediately enabled to turn on the sound side, although the necessity for its free dilatation continues as great as before—the diseased being still in a state of perfect inaction. In the case of pneumothorax with empyema, related in the fifth volume of the Dublin Transactions, in which the operation of paracentesis was performed, the patient was enabled to lie on the sound side the night after the fluid was drawn off, though it was ascertained by auscultation that the side was then

* See, for example, *Frank*, de Curand. Hom. Morb. t. viii. p. 232; *Duncan*, Edin. Journ. loc. cit.; *Andral*, op. cit. p. 240.

* *Andral*, op. cit.

† Observations on Surgery, p. iii. edit. 2.

filled with air, and the necessity for the free dilatation of the sound side consequently as great as before the operation.

These observations render it probable that the difficulty of lying on the sound side arises from the load which is thereby thrown on the mediastinum, as well as from the obstruction which the muscles of inspiration experience when the side which they have to dilate is placed under the weight of the body. To avoid this inconvenience, patients labouring under effusion into the chest generally lie on the diseased side, or else on the back, with a slight inclination of the body towards that side. This latter position is the more general of the two, and is so very characteristic as to lead in some cases to a suspicion of the disease even before any farther examination has been made. This position, however, is not so constantly observed but that we meet with frequent deviations from it. When the fever has completely subsided, and the thoracic viscera have become habituated to the pressure of the effusion, the patient can sometimes lie indifferently on his back or on either side; and there are even some cases on record where the patient lay constantly on the sound side. J. F. Isenflam relates a remarkable case of this kind in which a patient presenting all the usual symptoms of empyema lay generally on the right side, which for this reason was supposed to be the seat of the disease. Accordingly the operation was performed, but no pus was found. The patient died, and on dissection it was discovered that the left side was the seat of the empyema.* Morgagni relates a case of this kind, on the authority of Valsalva, and M. Baffos† records another instance. These, however, may be considered as exceptions to a general rule, and probably depend on some adhesions which confine the effusion, and prevent its gravitating to the most dependent part of the chest.

When the empyema is double, the patient can seldom lie in the horizontal position, but remains constantly seated with his body inclined forward.‡

3. *Dilatation of the side.*—When we strip a patient affected with empyema, and examine his chest, we generally perceive a marked difference in the size and shape of the two sides; that into which the effusion has taken place appears considerably larger; and this difference, which is most evident posteriorly, is rendered still more remarkable by the altered position of the ribs, which continue fixed immovably in the position they naturally occupy during full inspiration, and contrast strongly with the increased motion of the ribs of the opposite side. The intercostal spaces are also remarkably wide, and in some cases, especially in thin persons, project beyond the level of the ribs: this latter sign is of considerable importance, as it serves to distinguish empyema from hepatization of the lung or enlargement of the liver.

The increased size of the diseased side is in general very perceptible to the eye when it amounts to five or six lines: it seldom exceeds

an inch and a half; but in Dr. Croker's case, already alluded to as having had seven imperial quarts of pus drawn off at one time, the difference amounted to three inches and a half. The most accurate way of ascertaining whether any and how much dilatation exists, is by measuring both sides with a tape carried from a central point in the sternum under the mamma to the spinous process of the corresponding vertebra. The xiphoid cartilage frequently deviates from the median line, and is therefore an improper point to measure from: it may be also well to observe that the right side of the chest is generally some lines larger than the left, probably from the greater development of the pectoral muscles of that side. Another cause which might lead to erroneous conclusions from the measurement of the thorax is, that in those cases of empyema where absorption takes place to a certain extent, the parietes of the chest fall in as the effusion is removed: in this way the diseased side comes to measure less than the other; and if the thorax were measured for the first time under those circumstances, the sound side would appear comparatively dilated, and might be mistaken for the seat of the disease. This error would, however, be at once rectified on applying the stethoscope. In deformed persons it is impossible to draw any inference from measurement of the thorax, and in fat persons, especially in females, the results are often very unsatisfactory. To sum up—dilatation of the diseased side may be considered as one of the most valuable symptoms of empyema; but it is frequently wanting even in those cases where the effusion amounts to several pints; and as it may proceed from various other causes, such as pneumothorax, emphysema, and enlargement of the liver, so it cannot be relied on as a single symptom, though in combination with others it is a most valuable diagnostic mark of the disease. It should also be recollected that the diameter of the diseased side may be less than that of its fellow in consequence of the partial absorption of the effusion; indeed this case is by no means uncommon.

4. *Edema of the side.*—Edema of the integuments of the diseased side, extending sometimes to the arm and side of the face, is an occasional but by no means a constant symptom of empyema: it sometimes occurs at an early stage of pleurisy, accompanied with pain and tenderness in consequence of the inflammation extending to the superjacent parts, and in some instances does not make its appearance before the last stages of the disease. Purple ecchymosed spots have also been observed on the most dependent part of the thorax. They are said to occur chiefly when the effusion is composed of blood.

5. *Fluctuation.*—This can sometimes be felt, in very thin subjects, through the intercostal muscles. In a patient who was recently operated on in the Richmond Hospital in Dublin, it was very evident. It is one of the least fallible signs of empyema, but yet should not be trusted to exclusively, as abscesses occasionally form in the parietes of the chest, which yield a similar sensation to the finger. In November 1830, a subject was placed on the table in the

* Versuche einer praktischen Abhandlung neber die Knochen. Erlangen, 1782.

† Op. cit.

‡ Andral, op. cit.

dead room of the Whitworth Hospital, with considerable enlargement of the right side, and distinct fluctuation in the intercostal spaces. On removing the integuments, we discovered that both the enlargement and the fluctuation were caused by an enormous abscess of the liver, which had made its way through the diaphragm near its anterior attachment to the ribs, and had thence poured its contents into the cellular tissue which invests the muscles on the side of the chest, and thus produced the sense of fluctuation so distinctly felt between the ribs. A case nearly similar is recorded by Morand, who performed the operation of paracentesis between the third and fourth false ribs, in a case which he supposed to be empyema from the oedema of the integuments and deep-seated fluctuation; but he found to his surprise that the chest was perfectly sound, and that the pus which was situated in front of the pleura came from an abscess in the liver.* We have likewise heard of an encephaloid tumour, projecting between the ribs, having been mistaken for a case of empyema pointing externally, and opened accordingly.

These examples are sufficient to show the importance of carefully examining every symptom of the disease, instead of trusting exclusively to any one sign, however unequivocal it may appear. Fluctuation is much more frequently perceptible through the intercostal spaces when the empyema is circumscribed, than when the fluid is effused into the general sac of the pleura; in the former case it not unfrequently points externally, and by its rupture affords an exit to the encysted matter. When these fluctuating tumours communicate with the bronchi through the substance of the lungs, they usually acquire an emphysematous feel, as in the remarkable case related by Dr. Duncan, in which several tumours of this description were formed over the surface of the diseased side.†

6. *Ægophony*.—The peculiar modification of the voice, termed ægophony, scarcely deserves to be enumerated among the signs of empyema, as it is only heard in those cases of effusion where the fluid interposed between the surface of the lung and the interior of the chest forms a thin layer of only a few lines in thickness. Whenever the effusion exceeds this quantity, the ægophony invariably ceases; and hence it is seldom audible in empyema, where the effusion is generally very extensive, and accumulates in the most dependent part of the chest, instead of forming a thin layer over the surface of the lungs, as in cases of recent pleurisy. Whenever, therefore, ægophony continues to be heard in cases of chronic effusion accompanied with cough, difficulty of breathing, and hectic fever, we may infer with tolerable certainty that the empyema constitutes an inconsiderable part of the disease, and that tubercles, or some other morbid structure, are formed within the chest.

7. *Fluctuation on succussion*.—The sound of fluid splashing within the chest, similar to that

produced by agitating a cask partly filled with water, may sometimes be heard on applying the ear to the chest while the body of the patient is gently shaken. This sound has generally been described as the most pathognomonic sign of empyema, but as it never occurs except when the pleura contains air as well as fluid, it should more properly be considered as a symptom of the empyema being complicated with pneumothorax, and consequently as affording a more unfavourable prognosis, especially where the pneumothorax proceeds, as it most commonly does, from the rupture of a tuberculous abscess in the lung. (See PNEUMOTHORAX.)

8. *Dull sound on percussion*.—When we employ percussion over the chest of an individual labouring under empyema, the difference of sound elicited from the healthy and the diseased side is very striking, the former being clear and hollow, while the latter is as dull as if it were the thigh that had been struck. When the effusion is so extensive as to occupy the whole side of the chest, the sound is perfectly dull all over that side, unless in those parts where the lung is retained in contact with the chest by old adhesions. When the effusion only occupies the lower part of the chest, the dullness of sound is confined to that region; and in cases of circumscribed empyema the dull sound corresponds exactly to the surface of the effusion, if the fluid be in contact with the costal pleura; but when it is confined between the lung and mediastinum or diaphragm, or between two adjoining lobes of the lung, the sound on percussion is seldom appreciably altered, and hence the diagnosis of these affections is often extremely difficult.

9. *Absence of the respiratory sound*.—Over the same extent of surface, and for the same reason that the sound on percussion is rendered dull, the respiratory murmur is totally extinguished. This absence of the natural sound is in general very apparent, and is among the most constant of all the physical signs of empyema. There are, however, some sources of fallacy in the evidence furnished by the state of the respiration in this disease, which it is important to be acquainted with. In some cases where the respiratory murmur is completely extinct, the air still continues to enter the bronchial tubes, though it cannot penetrate into the cells, and thus bronchial respiration may be heard over the situation which the condensed lung occupies; and if the bronchial tubes be obstructed with mucus, the different varieties of mucous rattle may likewise be heard in the same situation. Another circumstance calculated to mislead is, that the puerile respiration of the sound side is sometimes transmitted along the parietes of the diseased side, and may thus lead the auscultator into the erroneous supposition that respiration was going on in the diseased side: this error may in general be avoided by observing that the intensity of the respiratory murmur gradually diminishes as the stethoscope is removed from the sound side; and this criterion will be still farther confirmed by examining the ribs of the

* Richter, Chir. Bibl. t. iv. p. 146.

† Medico-Chirurgical Transactions of Edinburgh, vol. i.

diseased side, which will be found in a state of inaction, if the respiratory murmur be really transmitted from the opposite side. Another source of error, still more calculated to convey a false impression of the true nature of the disease, arises from the lung being retained in contact with the parietes of the chest by old adhesions. In such cases the effusion cannot insinuate itself between the chest and the surface of the lung, so as to compress its substance or mask its sounds; and hence the respiration continues to be heard, more or less plainly, over an extent of surface corresponding to the internal adhesions; most commonly the lung is attached at its upper lobe, more rarely at its lower, and in some instances the attachment extends vertically from the apex to the basis. These extensive adhesions constitute one of the most perplexing obstacles to the detection of this disease. Whenever respiration is suspended in one lung, the other, if free from disease, invariably takes on a compensatory increase of action, and the respiration becomes puerile: this phenomenon is therefore of considerable importance, as it announces the inefficiency of the opposite lung.

10. *Displacement of the heart.*—The science of morbid anatomy furnishes numerous examples of the strongest membranes yielding to the application of constant and gradually increased pressure; in empyema, and likewise in pneumothorax, the mediastinum yields to the distending force of the accumulated fluid, and allows the heart to be displaced by its pressure. When the left side is the seat of the effusion, the heart is thrust from its natural situation, either down into the epigastrium, where it may be seen and felt pulsating, or over to the right of the sternum, where its pulsation is sometimes so strong as to attract the attention of the patient. When the effusion is in the right side, the change in the heart's position is not in general so remarkable; but by careful examination with the stethoscope, it will generally be found to pulsate considerably to the left of its natural situation. In two cases, one of which we have already alluded to as having been lately operated on for empyema, the apex of the heart was distinctly felt striking against the stethoscope between the fourth and fifth ribs in the left axilla.

As, then, displacement of the heart is constantly produced by effusion into either sac of the pleura, and seldom if ever arises from any other cause, it may be considered as the most constant and least equivocal of all the signs of effusion, and, when joined with other symptoms and physical signs of empyema, may be regarded as quite pathognomonic.

11. *Depression of the diaphragm.*—The diaphragm in like manner yields to the pressure of the incumbent fluid, and descends into the abdomen, thrusting the abdominal viscera before it. When the right side of the diaphragm is depressed, the liver is protruded beyond the margin of the ribs, and has even been felt so low as the iliac fossa.* Such cases have re-

peatedly been mistaken for enlargement of the liver. Of this a remarkable instance is recorded by Roux, in a memoir appended to the third volume of Desault's works, where, in a case pronounced by one of the most eminent medical men in Paris to be an incurable enlargement of the liver, the true nature of the disease was discovered by Bichat, who performed the operation of paracentesis thoracis, and thereby saved the patient's life.

12. *Abdominal pressure.*—Another test of the existence of pleuritic effusion imagined by Bichat, and described by Roux in the memoir just quoted, is the effect of pressure on that side of the abdomen where the effusion is suspected to exist. According to those celebrated anatomists, pressure exerted on that side of the abdomen corresponding to the empyema, thrusts the diaphragm and the fluid which rests on it up into the thorax, and thus, by increasing the pressure of the effusion on the lung, produces an insupportable sense of suffocation. In those cases where we have employed this test, the result was the very opposite of that above stated; for while no uneasiness was produced by pressing up the diaphragm into that side where the effusion existed, any attempt to stop the free motion of the diaphragm at the other side, where alone respiration was still carried on, was most distressing to the patient. The same observation has likewise been made by M. Chomel.*

13. *Cough and expectoration.*—The cough in empyema is generally short and single, and when there is no accompanying bronchitis, is often wanting altogether. If there be any expectoration it is generally catarrhal, unless when a communication is established between the bronchi and the fluid effused in the pleura; in which case the quantity of matter expectorated is sometimes so great as to threaten suffocation. This, however, can only occur when a large communication is suddenly formed and opens directly into one of the principal bronchi; but in those cases where the rupture is small and communicates only with the lesser bronchi, the evacuation of the fluid must go on slowly and by small quantities at a time. In such cases it is often difficult to determine the source of the expectoration: some writers describe it as possessing a peculiar fetor which is quite characteristic. Laennec compares the smell to that of gangrene.† Professor Nespoli to the smell of assafoetida, "ma assai più di questa penetrante e acido."‡ Some have compared this odour to garlic, some to that of phosphoretted hydrogen, and others to other ill smells.§ But as these fetid smells have all been observed in the expectoration of gangrene, and even of simple bronchitis, too much importance should not be attached to this sign; more particularly as in many cases of fistulous communication between the pleura and bronchi no such fetor has been observed. When, however, this appearance of the expectoration is

* Dictionnaire de Médecine, Art. *Pleurisie*.

† Page 447.

‡ Discorso, &c. Firenze, 1825.

§ Dr. Forbes's Note to Laennec, p. 447.

* Stoll, Ratio Medendi.

accompanied with a marked improvement of other symptoms, and with a diminution in the diameter of the dilated side, we may conclude that a communication with the bronchi has been formed; and this diagnosis will be still farther confirmed if the signs of pneumothorax supervene in consequence of the atmospheric air entering through the communication.

14. *Fever*.—The febrile symptoms which accompany this disease vary considerably, according to the constitution of the individual and the progress of the effusion: thus, while acute empyema is usually accompanied with rapid pulse, burning heat of skin, and other symptoms of the highest degree of febrile excitement, the more chronic forms of the disease often present no other symptom of fever than a slight acceleration of the pulse towards evening, or after taking food; and the patients sometimes even enjoy a state of perfect apyrexia.

It has been remarked by Broussais, and the observation has been confirmed by Andral, that the hectic of empyema is never accompanied with profuse night-sweats, unless when tubercles are developed in the lungs or in the false membranes of the pleura. Another peculiarity in the hectic of empyema, according to Broussais, is, that the pulse generally returns to its natural frequency after rest, particularly after a night's rest; whereas, in the hectic of phthisis, the pulse seldom or never comes down to its natural standard. The same author likewise states that in the hectic of empyema there is seldom any flushing of the cheeks, unless when the difficulty of breathing is very great, in which case the face and lips present a bluish tint and congested appearance, arising no doubt from the deficient aeration of the blood; whereas in phthisis the circumscribed flushing of the cheeks contrasts strongly with the marked paleness of the rest of the countenance. Whenever, therefore, the hectic fever of empyema presents the symptoms just described as appertaining to the hectic of phthisis, we may conclude that the effusion is probably complicated with tubercles in the lungs, or in the false membranes of the pleura.

From these observations it appears, that although there is no one symptom or physical sign which, taken singly, can be considered as pathognomonic; yet, from the combination of these symptoms with the physical signs derived from auscultation and percussion, the presence of empyema may be inferred almost with certainty. It must however be admitted that we occasionally meet with cases in practice in which it is extremely difficult to ascertain the existence of effusion. This difficulty, in some instances, depends on symptoms being present which appear incompatible with the presence of effusion, and in others on the only symptoms present being common to empyema with other affections, and consequently insufficient to decide the true nature of the disease.

To the former class belong those cases of empyema in which the lung is extensively attached to the costal pleura, and those of circumscribed effusion situated in the interior

or bottom of the chest; in both of which cases, contrary to what usually occurs in empyema, the respiration continues audible, and the sound on percussion is little if at all affected. The diagnosis of these cases has already been the subject of consideration.

The diseases which from the similarity of their general symptoms and stethoscopic phenomena are most liable to be confounded in practice with empyema, are tubercular consumption, hepatization of the lung, the development of morbid growths in the pleura, and, when the disease is at the right side, enlargement of the liver.

We shall now offer a few remarks on the distinctive characters of these different affections.

1. *Tubercular consumption*.—The general symptoms of phthisis and empyema are sometimes so precisely similar as to have deceived even the most experienced practitioners. The stethoscopic phenomena of these diseases are, however, so very characteristic, that it is scarcely possible now to confound them. In the first stage of phthisis, when the tubercles are in their crude state, the respiratory murmur is seldom if ever so completely suppressed as in empyema. In the former disease the absence of respiration first commences, and is always most marked, in the upper lobe, and in the latter in the lower lobe. At a more advanced stage, when the tubercles are softened, the characteristic signs of pectoriloquy, mucous râle, and gurgling cough, at once point out the true nature of the disease, and prevent the possibility of mistaking it for empyema.

2. *Hepatization of the lung*.—Owing to the similarity of the stethoscopic phenomena which hepatization presents, it is much more likely to be confounded with empyema. The following signs will, however, seldom fail to enable the physician to distinguish these diseases. In hepatization the antecedent symptoms are those of the first stage of pneumonia, and the cough is usually attended with characteristic viscid sputa; the respiration is never totally suppressed, but its place is supplied by strong bronchial respiration and resonance of the voice; the side is never enlarged; the intercostal spaces are never protruded; and the heart is never displaced; either of these symptoms occurring will, therefore, at once decide in favour of empyema. To these distinctive characters we may add that chronic empyema is, comparatively speaking, a disease of common occurrence; whereas chronic hepatization is an affection so rare, that Laennec commences his chapter on the subject by questioning the reality of its existence. This opinion is confirmed by the experience of Andral, who states* that of one hundred and twelve cases of pneumonia treated in La Charité, only one exceeded thirty days, or could be regarded in the light of a chronic disease. Chomel and Louis likewise concur in describing chronic peripneumony as one of the rarest forms of pulmonary disease.

3. *Tumours in the sac of the pleura*.—The same remark is likewise applicable to the de-

* Op. cit.

velopment of those tumours in the pleura which compress the lung and occupy its place. A remarkable case of this kind is related by Corvisart in the "Bulletins de la Faculté de Médecine." The patient's symptoms were such as to lead this accurate observer into the belief that the disease was empyema; but, on dissection, he was surprised to find instead of pus a solid substance answering to Laennec's description of encephaloïde, occupying the entire of the left side, the lung having, as he describes it, totally disappeared. An analogous case is recorded by Boerhaave, as occurring in the person of the Marquis de St. Auban.* M. Reclamier found in the body of a patient whom he considered as affected with empyema, one side of the chest entirely filled with a mass of tuberculous matter. A still more remarkable example of this disease is recorded by Laennec,† to whom it was communicated by M. Cazol.

4. *Enlarged liver.*—The last disease which we shall enumerate as liable to be confounded with empyema is enlargement of the liver. This viscus is sometimes so much increased in size as to ascend into the thorax, and compress the lung into the upper and back part of the chest. In such cases the sound on percussion is as completely dull, and the respiratory murmur as perfectly extinct, as in empyema. Neither is the diagnosis always facilitated by referring to the earlier symptoms of the disease, as empyema is often ushered in with the same dull pain in the hypochondrium that usually attends hepatic disease; and the projection of the liver beyond the margin of the ribs may proceed either from enlargement of that organ, or from its being thrust down by the pressure of the superincumbent fluid. Such are the principal points of similitude between these diseases, which have frequently imposed on the most experienced practitioners, but which it is of the greatest importance to distinguish, as is exemplified in the case already quoted from the memoir published by Roux, where the life of the patient supposed to be labouring under incurable disease of the liver was saved by the operation for empyema, which the accurate discernment of Bichat discovered to be the real disease. It is only necessary to allude here to the possibility of mistaking these diseases one for the other, as it seldom happens that their diagnosis is not rendered sufficiently easy by the presence of some unequivocal symptom, either of hepatic disease or of empyema.

Prognosis of empyema.—The prognosis in this disease is generally unfavourable, as by far the greater number of cases terminate fatally, whatever treatment is adopted. But as empyema is more properly the termination of a pre-existing disease than a primary or specific affection, it is impossible to form a correct prognosis of its probable termination in any given case without taking into consideration the character of the pre-existing disease and the condition of the lung and pleura, as well

as the amount of the effusion and the possibility of its removal; for on these circumstances the issue of the case principally depends. Thus, for example, while the empyema produced by the rupture of a tuberculous abscess in the lung has never, as we believe, been known to terminate otherwise than in death, the empyema which succeeds to penetrating wounds of the chest has in a great number of cases terminated favourably.* In the former case the effusion is produced by, and complicated with an incurable affection of the lung, while in the latter it is unconnected with any organic disease of the thoracic viscera.

In acute empyema, when the effusion increases rapidly, and is accompanied with great difficulty of breathing and febrile excitement, the disease may prove fatal by suffocation during the acute stage, or, as more frequently happens, may degenerate into the chronic form.

In chronic empyema, whether proceeding from acute or chronic pleurisy, the termination of the disease, when abandoned to the resources of nature, is almost invariably fatal; though, if we could place implicit confidence in the representations of the older writers, it would appear by no means uncommon that it should terminate by absorption, or even by critical evacuation. Billard states that a case of empyema, on which he was on the point of operating, terminated favourably by a critical sweat, produced and kept up by the internal use of the acetate of ammonia, which he therefore recommends as a most efficacious remedy in this disease.† The effusion of empyema has also been stated to have passed off, by metastasis, from the intestinal canal, from the bladder, from the vagina; and is said in one instance to have vanished on the eruption of a scabies.‡ Dr. Darwin relates the following extraordinary instance of recovery from this disease:—A servant man, after a violent peripneumony, was seized with symptoms of empyema, and it was determined after some time to perform the operation: this was explained to him, and the usual means were employed by his friends to encourage him, by advising him "not to be afraid," by which good advice he conceived so much fear that he ran away early next morning, and returned in about a week *quite well*. Without, however, incurring the imputation of scepticism, we may perhaps be permitted to doubt the accuracy of these observations, and to question whether the disease thus marvellously cured had ever existed, especially as we have seen how very inadequate the means of ascertaining the existence of the disease were in those days.

Of eighteen cases of chronic pleurisy recorded by Broussais in his "Histoire des Phlegmasies Chroniques," only one ultimately recovered. Laennec likewise states that the disease has seldom any natural tendency

* See Baron Larrey's Mémoire sur les effets de l'opération de l'empyème, Chirurgie Militaire.

† Dictionnaire des Sciences Médicales, Art. *Empyème*.

‡ Good's Study of Medicine, vol. 2.

* Zimmerman, Traité de l'Expérience.

† Op. cit.

towards resolution, and this statement has been so fully confirmed by the experience of modern physicians, that doubts are now very generally entertained whether the fluid is ever removed by absorption in cases of genuine empyema; and, accordingly, it has been recommended on high authority, that the operation of paracentesis should be performed as soon as ever the presence of empyema can be ascertained with certainty. "In tali casu," says Willis, "pharmacia haud multum opus erit, sed tantum corpore preparato illico ad lateris apertione procedatur."^{*}

But although the instances of recovery from this disease by the absorption of the effusion are not sufficiently numerous to inspire us with much confidence in the efficacy of the remedies usually employed for that purpose, still there are a sufficient number of well authenticated facts to prove the possibility of the disease terminating in this favourable manner, and, consequently, to establish the propriety of trying the effect of appropriate remedies before having recourse to the operation, unless in those cases where the effusion is so extensive as to preclude all reasonable prospect of its absorption, or the symptoms of suffocation so urgent as to require the immediate evacuation of the fluid.

Treatment.—In order to promote the resolution of this disease, the first object of medical treatment should be to moderate any febrile excitement which may arise, as experience has fully proved that a state of perfect apyrexia is the most favourable condition for the absorption of the effusion; for this purpose it is seldom necessary to have recourse to general blood-letting, unless in cases of internal hemorrhage. Cupping over the part or leeches may occasionally be applied with advantage when an exacerbation of the pain and other symptoms indicate the supervention of a fresh attack of inflammation on the diseased surface; but a rigid enforcement of the antiphlogistic regimen will be found the most effectual method of subduing the fever. "This point is of such paramount importance," says M. Broussais, "that I regard it as the basis of the treatment in all those chronic affections of the chest which are sufficiently violent to excite fever; indeed, the physician cannot be too strongly impressed with the idea that, so long as any fever continues, the more his patient eats the shorter time he lives, and that by lowering his diet he will take a more prompt and effectual method of removing the febrile paroxysms than by repeated bleedings, or by covering his chest with blisters."[†] These observations are particularly applicable to those paroxysms of fever which supervene during the course of chronic pleurisy: for so long as they continue, any attempt to repair the strength by the use of nutritious diet will only aggravate the fever and increase the consequent debility. When, however, the fever subsides, it is of the greatest importance to support the patient's strength by the use of light nutritious diet, and even by

the administration of tonics and stimuli when required, taking care, however, to avoid pushing the tonic treatment so far as to reproduce fever. At the same time, the absorption of the fluid may be promoted by increasing those natural discharges of which nature sometimes avails herself, as of so many emunctories, for the evacuation of internal suppurations, and by exciting artificial discharges from the surface by the use of counter-irritants and derivatives.

Purgatives, according to Laennec, to be useful, ought to be pretty frequently repeated. They are particularly indicated subsequently to bloodletting, when the abundance of the effusion, or the rapidity of its formation, and the general symptoms give reason to presume that the pleurisy is hemorrhagic.

On the same authority, diuretics are said to have no evident effect upon the absorption unless they are given in larger doses than is customary. He was in the habit of carrying the acetate of potash to the extent of six drachms or even of two ounces in the day, and gave nitre in doses of from forty grains to three or four drachms if the patient bore it well. With this latter Laennec sometimes combined sal ammoniac, according to the method of Triller, and also gave with advantage the extract of squills, as recommended by Quarin, in a minimum dose of two grains every three hours.^{*}

Diaphoretics and expectorants have likewise been found serviceable in some instances, and may therefore deserve a trial, especially in those cases where the efforts of nature manifest any tendency to produce a critical evacuation by diaphoresis or expectoration, in which case the propriety of promoting the discharge established by nature is manifestly indicated.

So long as any fever is present, counter-irritants of any kind should be employed with the greatest caution; but when the febrile symptoms subside, a large blister may be applied with advantage over the affected side, and kept open for several days, provided it does not produce much constitutional irritation. If the effusion does not diminish under this treatment, it will be advisable to heal the blistered surface and try the effect of a different kind of counter-irritant; for this purpose setons or caustic issues may be used, but, in order to produce any decided effect, they should be kept discharging for a considerable length of time. The use of the moxa is strongly recommended by Baron Larrey, who states that he has seen it act most beneficially as a revulsive in several cases of empyema.[†] The actual cautery is another powerful revulsive, which was much employed by the older surgeons, who seem to have frequently had recourse to it with decided benefit as a means of establishing a counter-irritation and derivation from the diseased pleura.

There is another mode in which the efforts of nature occasionally effect a cure in this disease, namely, by the formation of a fistulous

^{*} De Empyemate, p. 97.

[†] Phlegmasies Chroniques, vol. i. p. 355.

^{*} Dr. Forbes's Translation of Laennec, p. 473.

[†] See Observations sur les Effets de Moxa, in the Journal Complémentaire, tom. v.

passage through the lungs or through the walls of the chest, which serves as an outlet to evacuate the matter contained within the pleura. This spontaneous evacuation of the matter of empyema occurs chiefly, if not exclusively, in those cases where the empyema is circumscribed, and the fluid is prevented from escaping laterally by adhesions. When no such adhesions exist, the fluid having full liberty to accumulate within the chest, seldom points externally; and, accordingly, it is extremely rare to find any appearance of erosion or ulceration in the costal or pulmonary pleura when the effusion occupies the general sac of the pleura, though such appearances are by no means uncommon when the effusion is circumscribed.

Laennec states that the spontaneous evacuation of the matter of empyema is more frequently effected by rupture into the bronchi than by ulceration through the walls of the chest; but in comparing the records of those cases which have been published in this country as well as in France, it appears that their comparative frequency is pretty nearly equal.

When the matter bursts into the bronchi, the communication is generally formed by the detachment of a gangrenous eschar, or by erosion and ulceration of the pleura and pulmonary substance. The passage thus formed is usually lined with an adventitious membrane, which prevents the matter from infiltrating the tissue of the lung, and conducts it directly into the bronchi, from whence it is subsequently removed by expectoration. Many instances of this mode of the escape of pus are on record. Dr. Forbes met with a case of this kind, and has had several undoubted instances related to him by practitioners.* Broussais gives two cases of gangrenous perforation of the pleura pulmonalis, and another in which the communication seems to have taken place from simple ulceration. Le Dran met with four cases in which the disease terminated in this way. A case of rupture of a circumscribed empyema into the bronchi, followed by a copious expectoration of fetid matter, lately fell under the observation of the writer of this article. Laennec also has seen the effusion of chronic pleurisy burst into the bronchi, and Andral observed a similar occurrence in a case of acute empyema. Several other cases may likewise be found in the periodical literature of this country.

When the empyema is about to make its way outwards through the parietes of the chest, the escape of the matter is usually preceded by the appearance of a soft, doughy, inelastic swelling of the integuments, which generally advances in the course of a few days so as to form a distinct fluctuating tumour, and either breaks spontaneously, or else requires an artificial opening to be made through the integuments, in order to give issue to the matter contained underneath. This ulcerative process generally commences in the costal pleura or in the false membranes with which it is lined, and passes in succession through the superincum-

bent parts; sometimes, however, it commences by the formation of an abscess in the walls of the chest, which, bursting both externally and internally, forms a fistulous passage for the escape of the contained fluid. Instances of this termination of empyema are to be found in the writings of almost every author who has treated of this subject. Andral gives three cases in which the matter made its way through the intercostal spaces, and a fourth in which it perforated the diaphragm. Several similar cases are recorded in Le Dran's observations, and in other works on surgery.

The escape of the matter either through the bronchi or through the walls of the chest is generally followed by immediate relief of all the most urgent symptoms, and in some cases the fistulous passage soon ceases to discharge, and cicatrizes; but in other instances the fistula remains open for several months, or even years, and continues to discharge a greater or less quantity of matter, until the suppurating surface gradually diminishes, and becomes at length obliterated by the cohesion of the walls of the abscess. Sometimes, however, the evacuation of the matter, so far from producing any alleviation of the symptoms, seems only to aggravate the disease and accelerate its fatal termination.*

In some cases the formation of one outlet is followed by the formation of several others in succession, as in a remarkable instance published by Dr. Duncan, in the 28th volume of the Edinburgh Medical Journal. A still more remarkable case of this kind is related by Dr. Betty, in the London Medical Repository for March, 1823.

This successive formation of several outlets for the evacuation of the matter of empyema occurs chiefly in those cases where the matter is confined in distinct compartments, having no communication one with the other, and, consequently, requiring each a separate outlet for the evacuation of its contents. A second orifice is also occasionally required when the outlet first formed is situated in the upper part of the chest; for in such cases that portion of the fluid which stands below the bed of the outlet has no means of escaping unless by the formation of another passage in a more dependent situation.

Paracentesis.—When, however, as too often happens in this disease, there exists no reasonable prospect of the effusion being removed by absorption, or evacuated by the efforts of nature, there yet remains the alternative of making an opening into the chest, and thus creating an artificial outlet for the discharge of the matter. This constitutes the operation of *paracentesis thoracis*, or, as it is sometimes called, the operation of empyema.

This operation is at all times easy of execution, productive of little pain to the patient, generally followed by immediate relief, and has in numerous instances been crowned with complete success. Sprengel, in his erudite work on the history of medicine, enumerates

* Op. cit.

* See the seventeenth case in the second volume of Andral's Clinique Médicale.

amongst the advocates of this operation the names of almost all the most distinguished medical and surgical writers, from Hippocrates downwards, many of whom from their writings appear to have practised this operation with a degree of confidence and success unknown at the present day. The same work likewise contains brief notices of such a vast number of cases in which the result was favourable, as are more than fully sufficient to establish the frequent success of this operation.

If, however, we reflect that emphyema is generally the effect of a pre-existing disease of the lungs or pleura, and that the effect of the operation is merely to remove the effused fluid, while the disease of the solids still remains behind, we must be prepared to expect that this operation should often fail of success.

Another cause of the failure of this operation is the condensed condition of the lung, which, from long compression, has lost its expansibility and elasticity. In consequence of this it slowly regains its natural dimensions; and in some cases the unfolding of the lung is still further opposed by the formation of false membranes on its surface. The space thus left between the lung and the walls of the chest by the evacuation of the fluid is filled with atmospheric air, which rushes in through the wound, and excites a purulent discharge so copious as to exhaust the patient's strength, while the inflammation it causes in the suppurating surface cannot produce the obliteration of the cavity, the parts being still too far apart to be agglutinated.

It sometimes happens, also, that the operation is followed by the decomposition of the matter discharged from the wound, which assumes a dark ichorous appearance, and exhales an odour insupportably fetid. This alteration in the sensible qualities of the secretion is generally attributed to the irritating effects of the atmosphere on the imperfectly organized membranes with which the pleura is lined.

These considerations should certainly make us cautious in having recourse to the operation so long as there remained a reasonable prospect of the fluid being removed by other means, but should not deter us from the practice in those cases where other remedies had been tried and found ineffectual, or where the urgency of the symptoms precluded all reasonable prospect of relief from their use. In such cases the sooner the operation is had recourse to the better, for, as Willis tritely observes, "*dummodo vires constabunt præstat remedium anceps experiri quam nullum.*"* Our greatest modern authority on the subject of pulmonary diseases, Laennec, was a great advocate for the performance of the operation.†

Notwithstanding these strong attestations in its favour, the operation has latterly fallen very much into disuse, as much perhaps from the uncertainty of the signs of emphyema as from any experience of its general inutility or danger. Now, however, that the diagnosis of this disease no longer presents the same difficulties

as it did formerly, and that we are enabled to recognize at any early period of their progress, those cases which may be benefited by the operation, and thereby have it in our power to operate early and consequently with better chance of success, it is probable that the operation will be employed more frequently and more successfully than it has hitherto been.* Within the last year the operation has been

* We learn that in London the operation has been repeatedly performed, more particularly under the direction of Dr. Thomas Davies. For the following tabular view we are indebted to the kindness of that intelligent physician, by whose advice the operations were performed. Dr. Davies has requested us to state that five of the cases belonged to Dr. B. Babington and one to Dr. Stroud; Dr. Davies was only called into consultation by these gentlemen.

Nature of the case.	Operator.	Event of the cases.		
		Recovered.	Under treatment.	Died.
Emphyema . . .	Mr. Stukely, late Apothecary to the Infirmary for Diseases of the Lungs			1
" . . .	Mr. Martin, Surgeon, R.N. . . .	1	"	"
" . . .	Mr. Headington . .	1	"	"
" . . .	Mr. John Scott . . .	"	"	1
" . . .	Mr. Herring, Apothecary for the Infirmary for Diseases of the Lungs	3	"	"
" . . .	Mr. Kiernan	2	"	"
" . . .	Dr. B. Babington . .	1	"	"
" . . .	Mr. Skey	"	1	"
Total emphyema . .		8	1	2
Pneumothorax, with effusion . . .	Mr. Headington . .	"	"	3
" . . .	Mr. John Scott . . .	"	"	2
" . . .	Mr. Kiernan	"	"	3
" . . .	Mr. Smith	"	"	1
Total pneumothorax . .		"	"	9
Hydrothorax . .	Mr. Herring	"	"	1
" . . .	Mr. Kingdom	"	"	2
Total hydrothorax . .		"	"	3
Grand total		8	1	14
Number of cases . . .		23		

Notes by Dr. Davies.—1. The result of the operation in the cases of emphyema is very satisfactory; eight of the patients out of ten having recovered. Of these, five were under six years of age, one was between eighteen and nineteen, and two were above twenty-five.

2. All the cases of pneumothorax were complicated with tubercular diseases of the lungs, a circumstance which, of itself, precluded a favourable result. All the patients were beyond twenty years of age.

3. All the cases of hydrothorax were the consequences of disease of the heart. Although none of the patients recovered, they were all relieved by the operation for a considerable time.—EDITORS.

* De Emphyemate, p. 97.

† See Translation, p. 191.

twice performed by the advice of Dr. Marsh, of Dublin, and in both instances the success of the operation has been complete. Dr. Crampton, and Mr. Crampton, the surgeon-general of Ireland, have also communicated to the writer the particulars of three cases from their practice in which the operation was equally successful.

The result of these cases is highly favourable to the more general adoption of the practice, and fully confirms the observation of a modern author, "that it is a measure which has frequently proved successful, and that too in a disease which is generally, if not always, beyond the influence of medicine and too often beyond the power of nature to remove."^{*}

There are two cases in which this operation is particularly indicated:—1. In acute empyema, when the breathing is extremely oppressed, and the effusion goes on rapidly increasing. In this form of the disease, however, it is always advisable, if possible, to defer the operation until the inflammatory symptoms shall have subsided, as it will be of little advantage to evacuate the contents of the pleura so long as that membrane continues in such a state of inflammation as to re-produce the effusion. When, however, the difficulty of breathing is so great as to render the immediate performance of the operation necessary in order to prevent the risk of suffocation, it is probable that this object may be sufficiently attained by making small punctures with a trochar from time to time, when the breathing becomes much oppressed, and drawing off only so much fluid as is necessary to diminish the pressure exercised by the effusion on the opposite lung. By operating in this way the breathing will be immediately relieved, and the danger avoided of admitting the atmospheric air into contact with an already highly inflamed pleura. Perhaps, too, this partial abstraction of the effusion may at once aid the absorption and accelerate the conversion of the false membranes; such, at least, is the opinion of Laennec.[†]

When acute empyema succeeds to penetrating wounds of the chest, it is advisable not to operate before the orifices of the wounded vessels are so firmly closed as to prevent any danger of a recurrence of hemorrhage; for this reason Baron Larrey recommends that the operation should not be performed in such cases before the seventh, or deferred after the eleventh, or, at farthest, the fourteenth day.

2. The second case in which this operation is particularly indicated is in those cases of chronic empyema where the ordinary means for promoting absorption have been tried and found ineffectual. In such cases it is impossible to lay down any general rule as to the precise period at which the operation should be performed, as that point must be determined by the state of the constitution, the urgency of the symptoms, and the extent of the effusion, rather than by the date of its formation. So

long as any reasonable prospect can be entertained of the disease being removed by the efforts of nature, or the influence of medicine, the effects of remedies should of course be tried, but at the same time it should be borne in mind that this disease is generally, if not always, beyond the power of medicine to relieve, and that the persisting in the employment of remedies which experience has so often proved ineffectual, can only tend to diminish the ultimate chance of success by deferring the operation, as is too often done, until the effusion becomes so extensive and the patient's strength and constitution so exhausted as almost to preclude the possibility of recovery.

It has been proved by experience that the operation is frequently successful when the patient is young and of good constitution, the effusion moderate in quantity, recently formed, and unaccompanied with organic disease of the lungs. On the other hand, the prospect of success diminishes considerably when the effusion is very extensive, of long standing, and accompanied by symptoms of confirmed hectic.

The copiousness of the effusion, however, though it generally diminishes the chances of recovery, does not necessarily preclude the success of the operation. Baron Larrey operated successfully in a case where the effusion amounted to fifteen pints; Dr. Hawthorne's patient lost twenty pints of pus during the first twenty-four hours; and in Dr. Archer's successful case, already quoted, eleven pints of fluid were drawn off at the first evacuation. The same remark is likewise applicable to the length of time during which the empyema has existed, and to the symptoms of hectic with which it is accompanied, as there are several cases on record where the operation was successfully performed under those unfavourable circumstances.*

In the numerous class of cases where empyema is complicated with pneumothorax from the rupture of a tuberculous abscess in the lung, the chance of any permanent advantage from the operation must necessarily be very small, in consequence of the incurable nature of the original disease: in such cases, indeed, little else can be hoped for from the removal of the effusion than a temporary alleviation of suffering, or the prolongation of existence for a few weeks or months at the utmost; such at least is the conclusion that we have formed, after having witnessed the progress and fatal termination of eighteen cases of this nature, in five of which the operation was performed with no better success than that just described. (See PNEUMOTHORAX.) Laennec, however, is of opinion that "we must not abandon all hope of cure even when there exists so serious a complication as this, provided there be no evidence of cavities in the opposite lung."[†]

The complication of pneumothorax does not seem to form so serious an objection to the

* Forbes's Original Cases, &c. p. 258.

† Op. cit.

* Dictionnaire des Sciences Médicales, art. *Empyème*.

† Op. cit.

operation, when not coupled with the presence of tuberculous abscesses in the lungs, as appears from its having been successfully performed in several cases where the sound of fluctuation, audible in the chest, sufficiently proved the coexistence of a gaseous and liquid effusion. Dr. Archer's remarkable case of this kind, published in the Transactions of the Association, has already been alluded to. A still more remarkable case of empyema with pneumothorax, terminating successfully by operation, is related by Dr. G. Hawthorne, in the Edinburgh Medical and Surgical Journal, No. 61.

Neither does the existence of a fistulous passage through the lung necessarily preclude the success of the operation, as is evident from those cases where it was performed after the empyema had burst internally into the bronchi, and yet the communication thus formed through the lung did not appear in the least to impede the patient's ultimate recovery. Le Dran relates a case on which he operated for empyema where "the injection of a small quantity of mel rosarum and barley-water through the wound excited coughing, and part of it passed off by the mouth, mixed with pus;" thus clearly proving the existence of a fistulous passage through the lung, notwithstanding which the patient recovered completely. Several similar cases are quoted in the Dictionnaire des Sciences Médicales, from the writings of M.M. Jaymes, Robin, and Bacqua. In these cases, however, the empyema must in all probability have been circumscribed, and the lung retained by adhesions in contact with the walls of the chest around the circumference of the wound; or else the injection, instead of entering the lung, would have fallen to the bottom of the pleura.

It is unnecessary here to enter into any minute description of the mode of performing the operation, as this is described in all treatises on the subject and in all systems of surgery; but the reader is more particularly referred to the works of Le Dran, Richter, Sharp, C. Bell, Larrey, and Boyer, where he will find all the necessary information.

Authors make a distinction in the operation according as the matter points externally or not. The former they term the *operation of necessity*, from its site being necessarily fixed; and the latter the *operation of election*, from the surgeon being at liberty to select at what part of the chest he makes his incision.

In the empyema of necessity, as it is termed, when the matter points externally, the sooner an incision is made into the tumour the better, as there is no chance of the matter being removed by absorption, and the consequence of delaying the operation has too often been the formation of long sinuous passages through the parietes of the chest and abdomen, and caries of the ribs. Indeed this operation is much more generally successful than that performed at the place of election, which no doubt arises from the circumstance that those empyemas which point externally are almost invariably

circumscribed, and confined to a small extent of the pleural sac.

When no tumour appears, to fix the site of the operation, the place of election generally recommended by surgeons in this country is between the sixth and seventh true ribs, where the indigitations of the serratus major anticus muscle meet those of the obliquus externus. Laennec prefers the space between the fifth and sixth ribs. "Many reasons (he says) point out this spot as the best suited for the operation: for instance, we know that the upper lobe adheres to the ribs more frequently than any other part of the lungs, and that the lower lobe is frequently attached to the diaphragm, while adhesions very seldom exist at the central part of the chest; and even should there chance to be any old adhesions in this point, they may be readily and certainly discovered by some remains of respiration over their site, and the place of the operation may then be varied accordingly: besides we know that the thickest false membranes exist at the junction of the diaphragm with the walls of the chest, and that at the right side an enlarged liver frequently reaches as high as the sixth or even as the fifth rib;" in which case, when the operation is performed in the usual situation, the instrument, instead of entering the chest, would transfix the diaphragm and penetrate the abdomen; there are several cases on record of the operation having been frustrated by this accident. Laennec informs us that in a case of pleuro-pneumothorax, after making an incision through the integuments between the fifth and sixth ribs, he thrust the trochar, as he thought, into the thorax, and was much surprised to find that no fluid followed its introduction; but on dissection he discovered that the instrument had entered the cavity of the abdomen, after transfixing the diaphragm, which had been thrust up into the chest by an enlargement of the liver, and had contracted a firm adhesion to the seventh rib.* A similar accident happened to La Motte;† and Solingen saw the diaphragm wounded by the introduction of a canula after the operation, which was performed between the first and second of the false ribs.‡ The only object of operating so low down is to make the opening at the most dependent part of the chest for the more complete evacuation of the effusion; but this object may be sufficiently attained by operating between the fifth and sixth ribs, which may in fact be made the most dependent point of the chest, by causing the patient to lie, as he generally feels disposed to do, on the diseased side. The danger of wounding the intercostal artery may be avoided by making the incision close to the superior edge of the lower rib.

When the incision is carried through the parietes of the chest and the false membranes with which they may be coated, a rush of fluid

* Op. cit.

† Traité complet de Chirurgie, vol. ii. obs. 77, p. 292.

‡ Handgriffe der Wundarznei, Th. ii. Kap. i. p. 175.

is immediately expelled by the pressure of the parietes, and continues to flow in an uninterrupted stream until the surface of the fluid falls to the level of the wound, after which it issues in a series of interrupted jets corresponding to the motions of the diaphragm; for as this muscle descends in inspiration, the fluid which lies on its surface sinks along with it, and the atmospheric air rushes in to fill up the space created by its descent: again, as the diaphragm rises in expiration, the incumbent fluid is elevated to the level of the orifice, and issues in a jet from the wound; this alternate sucking in of air and expulsion of fluid continues until the quantity of matter is diminished so as no longer to rise to the level of the wound during expiration, after which each movement of the diaphragm is followed by the alternate introduction and expulsion of air, so long as the wound is allowed to remain open. Many reasons, however, render it inexpedient to continue the operation to this period. The sudden removal of so large a quantity of fluid frequently produces such a shock to the nervous system as throws the patient into an alarming state of collapse; the withdrawing so great a degree of pressure from the heart and large bloodvessels and from the opposite lung must likewise derange materially the functions of these important organs, and consequently oppose the success of the operation; and another injurious consequence of protracting the operation until all the fluid has been evacuated is that the parietes of the chest are unable to accommodate themselves to the space which is thus left unoccupied, and which must consequently be filled with atmospheric air.

For these reasons, it is advisable to close the wound before the fluid begins to issue in an interrupted stream, and to repeat the evacuation at longer or shorter intervals, according to the extent of the effusion and the urgency of the symptoms. In general, the removal of twenty ounces of fluid at a time will be found sufficient to relieve the breathing, (as this effect is produced, at least in the first instance, by diminishing the pressure on the opposite lung, and not by restoring the functions of the organ at the diseased side,) and an interval of forty-eight hours may be allowed to elapse before the wound is again opened. When, however, the effusion is very extensive, and the breathing not sufficiently relieved by the removal of the quantity above specified, the fluid may be allowed to flow for some time longer, or the evacuation may be repeated at shorter intervals. When the principal part of the effusion has been removed in this way, a large poultice may be applied over the wound, and the remainder of the fluid allowed to escape as fast as it is secreted.

By this method of gradually removing the effusion we diminish the shock to the nervous system, relieve the thoracic viscera gradually from the pressure of the accumulated fluid, and prevent the introduction of air into the thorax, until the parietes have had time to accommodate themselves to the diminished volume of

their contents, and by their mutual approximation diminish, to the utmost, the space left by the evacuation of the effusion.

The following measurements taken from a patient of twelve years old, who lately underwent this operation, will serve to illustrate the diminution which takes place in the capacity of the diseased side by the falling in of its osseous parietes:—

	Circumference of the diseased side.		Circumference of the sound side.	
	In.	Lns.	In.	Lns.
Immediately before the operation	16	6....	14	1
Evening after the operation	16	3....	14	1
6th day after the operation	14	10....	14	1
7th day after the operation	14	6....	14	1
8th day after the operation	14	5....	14	1
9th day after the operation	13	9....	14	1

Thus, in the space of nine days, the circumference of the diseased side diminished nearly three inches. This contraction of the osseous parietes, aided by the ascent of the diaphragm, and the protrusion of the mediastinum from the increased dilatation of the opposite lung, reduce the cavity of the diseased side to so small a compass, especially in young subjects, whose ribs are susceptible of a much greater degree of motion than those whose cartilages are ossified, as to leave very little space unoccupied for the reception of air. This space is subsequently filled up as the lung gradually expands and rises into contact with its parietes: this, however, is always a very slow process, as several weeks in general elapse before the slightest trace of respiration can be perceived in the diseased side; as the lung continues to expand, the contraction of the side gradually diminishes, until at length the lung resumes its original dimensions, and the contraction of the side disappears altogether. In some cases, however, the dilatation of the lung is never complete, and the side remains permanently contracted in consequence. Lastly, there are some cases in which recovery takes place, although the lung never expands so as to fill the space left by the evacuation of the empyema. In these cases the wound made by the operation is converted into a permanent fistula, through which the atmospheric air is allowed to enter, and the matter secreted by the walls of the cavity to escape, without producing any very considerable inconvenience to the patient's health. Several cases of this termination of the operation are recorded by Plater and Schenkinius, and by M.M. Lefacheux and Audouard.* But perhaps the most remarkable case of this kind on record is that recently published by Dr. Wendelstadt of Hersfield, who underwent the operation of paracentesis for empyema in his own person, thirteen years ago, since which time the wound has remained open, and the fluid has been drawn off twice every day, sometimes half a drachm only issuing each time, sometimes so much as three or four ounces daily. Three

* See *Empyème*, in the Dictionnaire des Sciences Médicales.

years ago, being anxious to ascertain the dimensions of the cavity which existed in the thorax, he found that it was capable of containing a quart of warm water. The diseased side is much contracted, and does not move at all in respiration, yet he can blow the flute, and walk faster than many persons who are in perfect health, and for several years he has resumed the active discharge of his professional duties.*

Various expedients have at different times been contrived for extracting the air out of the pleura, with the view of removing the pressure from the lungs' surface, and thereby facilitating their expansion. A variety of syringes have been contrived for this purpose; and recently M. Laennec has proposed to apply a piston-cupping-glass over the wound immediately after the discharge of the liquid, and to produce a vacuum in the chest, more or less quickly, continuously, and completely, according to the effects. If this suggestion were to be put in practice, care should be taken to avoid exhausting the air so far as to suck out a portion of the lung through the wound, as happened to the writer of this article, when trying the efficacy of the proposed plan on a dog. Another objection to the success of this contrivance is the difficulty of preventing the air from again rushing in through the wound the moment that the exhausting glass is removed.

After all, it appears very doubtful whether the admission of air into the pleura is really as dangerous as it is generally supposed, or whether the quantity of air which is contained within the chest affords any such serious obstacle to the expansion of the lung, that its removal may not be safely intrusted to the power of the absorbents; as the experiments of Nysten, and more recently those of Speiss, (*De vulneribus pectoris penetrantibus*.) have fully proved that air introduced into the pleura is invariably removed by absorption in the course of a few days.

In those cases where the introduction of air produces an unhealthy discharge from the wound, the practice of using injections may be had recourse to with advantage for the purpose of correcting the morbid action of the suppurating surface, and removing the putrescent qualities of the discharge. Willis relates a remarkable instance of the efficacy of injections in such cases. The fluid drawn off at the time of the operation was perfectly inodorous, and continued free from smell for the first three days; after which, whenever the wound was opened, a smell, which he describes as "odor teterrimus, cloacæ ejusvis maxime putentis fætorum superans," infected the whole chamber; but by the repeated use of injections, the horrible fetor of the discharge was entirely corrected, and the patient ultimately recovered.† M. Freteau records another case in which, shortly after the operation, the discharge assumed a dark ichorous appearance, and exhaled

a gangrenous smell; but by persisting in the use of injections for twenty days, the matter discharged from the wound assumed a healthy appearance, and lost its disagreeable odour. Willis was in the habit of using a decoction of various aromatics and stimulating herbs for this purpose. MM. Freteau, Billery, and Audouard recommend the decoction of cinchona as less irritating than that used by Willis, and equally efficacious.* A weak solution of the chlorate of lime will probably be found to act still more efficaciously as an antiseptic

(R. Townsend.)

ENDEMIC DISEASES.—*Endemic* is a word applied to those diseases which occur among the inhabitants of a particular place or country, in consequence of something local or peculiar in the air, or water, or soil, or in the food and habits of the people. Hippocrates has left a treatise, which, though containing some crude observations, is a model that has been too much neglected by medical writers. His book *De Aeribus, aquis, locis*, according to Haller, is composed in a style, and contains reasoning, worthy of its great author. If we except the Dissertation on Endemic Diseases, by Hoffmann, we have few works written expressly on the subject. Yet it is one which we might suppose would have engaged the serious attention of physicians in all ages.

The knowledge of those peculiarities in climate, soil, elevation, and site of dwelling, and especially in food, drink, and habits; as well as of the moral and physical varieties which are found to co-exist with certain forms of disease, in any part of the human family, is a branch of medical science that seems to include some of its essential principles. It is a field that well deserves to be further cultivated; and as we are now becoming better acquainted with different parts of the world by means of more accurate and intelligent observers, it is to be presumed that the data will soon be multiplied, from which, upon comparison of one country with another, many useful practical hints may be deduced, and the real causes of some hidden things in this department of our science ascertained. Of late years, indeed, much to the credit of our professional brethren both in the east and west, many excellent monographs on the medical topography of different places have appeared. An interesting article, pointing out these and other works on the subject, is to be found in the sixteenth volume of the *Edinb. Medical Journal*, in the editor's learned review of the "Medical Topography of Upper Canada, by John Douglas." But it may be truly said of endemic diseases, generally, in the words of that able reviewer, that "a complete work on the subject is one of the greatest desiderata in our professional literature."

It is needless to expatiate on those things which are obvious to every enlightened observer. As in the body, different effects result

* *Journal der Praktischen Heilkunde*, Januar, 1831.

† *De Empyemate*, p. 98.

* *Dict. des Sciences Méd. art. Empyème*.

from the dry and bracing wind of the mountain, compared with those from the moist and sluggish air of the valley; so, as regards the mind, the observation of the poet is philosophically true,—

"An iron race the mountain cliffs maintain,
Foes to the gentler manners of the plain."

GRAY.

"La terra molle e lieta e diletta
Simili a se gli abitato' produce."

TASSO.

But as the physical effects are liable to be varied by climate, elevation, temperature, winds, and the vicinity of wood and water, as well as by the quality of food and drink and the habits of life; so the moral effects (if not indeed also the physical) may be varied by the state of liberty or oppression, of sloth or activity, of comfort or wretchedness, of cleanliness or filth, of mental apathy or cultivation, in which our fellow creatures in any part of the world may happen to be placed. From all these controlling circumstances need we wonder that diseases should assume such varied appearances? or that many who are living together in the same community, and even born on the same soil, should escape some of the evils to which their less fortunate neighbours are liable? If such escape, there is less cause to wonder that entire strangers should escape also. This in fact is often the case. And when the inhabitants of any particular country or place are especially liable to some form of endemic complaint, they are found to be for the most part exempt from other serious affections. It was a proposition of Dr. James Sims, a physician of acute observation, that if a patient on the verge of pulmonary consumption could be taken into a fenny country in the height of the season, so as to contract a severe ague, there would be little doubt of the phthisical symptoms being at once arrested. The natives of a country often become inured by habit to circumstances which very soon exert a dangerous influence on strangers. The marsh miasmata of the tropics are more pernicious to strangers than to the natives. The cold winds of the northern climates most frequently affect the natives of Africa and the Indies with mortal pulmonary inflammations. It is demonstrated in countries which are inhabited by different races of men, as the negroes and Malays, the Americans and negroes, that the same circumstances do not produce the same morbid effects on both classes. It has been frequently remarked that the water of the Seine produces a diarrhoea in every one except the Parisian accustomed to the use of it. The same treatment will not be required for the same diseases, or rather for diseases called by the same name, in different places and seasons, as in mountainous and in low situations, in summer and in winter, in hot and in cold climates, in affluent stations of society and in indigent. Baglivi says that at Rome ulcers of the legs are almost incurable, while wounds in the head heal without any trouble. Cleg-horn tells us of an old proverb, that "Minorca is good for the head but bad for the shins."

In France it is remarked that ulcers of the legs are more easily cured at Montpellier, and those of the head at Paris.*

Hippocrates and Celsus both remark that obstinate ulcers of the legs frequently exist in those who are affected with enlargement of the spleen.† The cretin of the close gorges of the Vallais loses his stupidity in the dry and sharp air of the high neighbouring mountains, while the brisk mountaineer experiences less of hemorrhage and of acute disease in the heavy and cloudy air of the valleys.‡

It is an old observation that hemorrhages, acute diseases, and inflammatory affections, are more common in dry and elevated situations, especially if these are much exposed to the north wind. The contrary may be expected in opposite situations, where the "plumbeus auster" lends its aid to weaken the body and depress the spirits.

It would undoubtedly be a useful work to trace, on an enlarged scale, a connected outline of the endemic diseases in different countries, with their topography, and the food and habits of the people. But we must regret that the statements or observations, within our reach, that relate to the supposed causes of such diseases, are many of them too loose and partial for scientific generalization. With such materials, all that can be proposed at present is a very general notice of some of the leading well-attested facts belonging to the most remarkable diseases that usually come under this denomination, and for obvious reasons every thing relating to their symptoms and cure must be committed to other articles of this work.

1. *Intermittent fever*.—No observation is more general than that ague is endemic among the inhabitants of places where marshes abound, and in seasons, as the spring and autumn, when the effluvia arising from them are more active, and the body perhaps more liable to be affected by their peculiar poison. There are few marshy countries, in temperate and tropical climates, in which intermittent fever is not known. The connexion, therefore, between them does not depend on a *limited*, but a comprehensive induction of facts: the truth is abundantly confirmed. Ague, indeed, sometimes appears where the influence of marsh effluvia cannot be traced; and the term *malaria* has been brought into modern use to denote a morbid atmosphere, arising from the soil, capable of producing intermittent fever, in which marsh *miasmata*, properly so called, are supposed not to constitute an essential part. Many facts would seem to countenance this opinion, as well as that which assigns to malaria the production of continued fever under certain circumstances. In the metropolis we have known persons attacked with ague, mostly however of an irregular type, by working in damp cellars. In temperate climates, under ordinary circumstances, the milder forms of the disease appear, and these in the spring, as the quotidian and

* See Dict. des Sc. Méd. art. *Endémique*.

† Cleg-horn, op. cit. p. 71.

‡ Virey.

tertian. The quartan, more obstinate and protracted, usually appears in autumn. In Sydenham's time, and even in that of Fothergill, the quotidian of spring became continued fever in summer; while the simple continued fever of summer often changed to a malignant type in autumn. These were simple observations at a time when systematic arrangements had not put physicians in trammels. But now, lest we should be guilty of medical heresy, we must not insinuate that ague can change into continued fever, and non-contagious fever into contagious typhus, either in an individual case or in the course of the year!

It has been commonly observed that the spleen suffers more in cases of protracted intermittents in temperate climates, and the liver in tropical. Nevertheless, Dr. Jackson tells us of enlarged spleen after such fevers in the West Indies: Cleghorn noticed the same in Minorca; and we have the testimony of W. Twining, that this organ is often found diseased from this cause, in Bengal and all the low districts of Hindostan.*

When tropical heat is added to the influence of marsh effluvia, then we have the various shades of intermittent, remittent, and even continued fever, passing sometimes into each other by almost imperceptible gradations, and complicated more or less with bilious symptoms. When intemperate seasons, deficient or unwholesome food, and animal filth, are superadded to the causes above mentioned, and acting upon a condensed population, the highest grades of pestilential fever are often exhibited, as the plague of Egypt and the Levant, the pestilential fever of Spain, and the yellow fever of America and the West Indies.

When marshy land is brought to a very dry state in summer, after long continued drought, ague is often but little known in the vicinity; but the first heavy shower after the drought will sometimes give rise to it. And on the contrary, in a wet season, while much water is lying upon the marshes, the disease is rare; but in proportion as they become dried to a certain point, the *miasmata* are found to be active, according to the degree of heat, the season of the year, and the state of the population. A certain quantity of moisture, therefore, seems to be necessary upon the marsh, in order that the *miasmata* may be disengaged; and of vapour in the atmosphere to convey them to a distance; while a superabundance either prevents their evolution, or entirely absorbs them.

Notwithstanding that the notion has been ridiculed by a few, there can be little doubt that currents of air will sometimes waft the effluvia to a great distance, so as to produce intermittent fever in places otherwise healthy; and some facts would seem to show that hills of a certain elevation in the vicinity of marshy grounds have a sort of attraction for the *miasmata*, and are almost as unwholesome as the plains.† But it is upon a different principle

that hilly grounds, in some cases, become more unhealthy than the plains. The British army in 1809 found that the hilly sides of the ravines in Portugal, after heat and rain, exposed the soldiers to a most destructive remittent, while the overflowed swamps below were more than usually free from disease: "and such," says Irvine, "is frequently the case on the lofty ridges of Sicily, when their fiumari, or water-courses, which are ordinarily dry, and used for roads in the summer months, are filled and inundated with sudden torrents of rain. For here the malaria changes its station, and quits the overflowed low lands for the heights of the primitive hills.**"

Plantations of trees have been known to intercept marsh miasmata, and thus to prevent their injurious effects upon the inhabitants at a short distance; and for the same reason it is found that the site of a dwelling should not be too near such plantations. "It is wonderful," says Dr. Ferguson, (loc. cit.) "to see how near to leeward of the most pestiferous marshes, in the territory of Guiana particularly, where these trees abound, the settlers will venture with impunity to place their habitations, provided they have this security; though every one is fully aware that it would be almost certain death for an European to sleep, or even to remain after night-fall, under the shade of the lofty trees that cover the marsh, at so short a distance.†"

There is something curious and not easily explained in the circumscribed locality of intermittent fever in certain places. Perhaps, if the prevalence of winds and the situation of such places as to exposure and wood and water, &c. were taken into account, the difficulty might be in part removed. A late writer on malaria states that on the high Dover road, in Kent, not far from Rochester, some of the people living on one side of the road were attacked with ague, while on the other side all escaped.

It is amply proved that marsh effluvia exert far more pernicious influence upon the body during the state of sleep, or even when it is exposed to them in the night air without sleep. It has also been observed, in illustration of the *ague-giving* qualities of the east-wind, that some time, even days or weeks, after an exposure to marsh miasmata has taken place without producing any perceptible bad effect,

1821; Dr. Ferguson on Marsh Poison. Dr. Robertson fully confirms the observation of Dr. Ferguson relative to the exposure of the inhabitants of high situations in the vicinity of marshy grounds to the effects of the *miasmata*. (Med. Repos. vol. i. p. 367.) He knew people to be severely affected by this cause, who had not been for some time without the walls of the castle of Santa Barbara, at Alicante, 800 feet above the sea-shore; while at the same time, persons living on a level with the sea, and exposed to all the sources of marsh miasma, escaped every attack of fever. He considers that the high grounds present an impediment to the free dispersion of the exhalations through the atmosphere.

* Good's Study of Medicine, vol. ii. p. 166.

† Med. Chir. Rev., Dec. 1821.

* Calcutta Medical Trans. vol. iii. p. 354.

† Medico-Chir. Review, vol. ii. p. 591, Dec.

the casual blowing of the east wind has at once fixed an attack of ague. Sea-water flowing over marshy ground, *cateris paribus*, seems to give rise to more pernicious effluvia than fresh water. The bogs or peat-mosses of Scotland and Ireland, on the other hand, do not appear to generate ague.

Dr. Clark, in his late work "On the Influence of Climate," states, that with regard to Rome, at the present time, "a certain period of residence in the malaria site is necessary, in general, to prepare the body for its attack; and that there is no reason for the fear commonly entertained of a sudden attack of malaria from simply passing quickly through a malaria district." "The German, French, and English artists were more frequently attacked with fever the second or third years of their residence at Rome than the first." But the situation of this city will not bear an exact comparison with that of a pure marshy district.

Seamen, who after a long voyage venture to land on a marshy shore in the height of the season, too often find that if they remain a single night on land, they are attacked by the endemic fever almost immediately. Hence it has often happened that vessels coming to a maritime city, on the eve of a pestilential visitation, although with clean bills of health, have been among the first to show signs of disease in some of the crew; and the fact has been eagerly laid hold of to countenance the suspicion that contagion from the vessel gave rise to the distemper; for it need not be told that mariners who have been long at sea are very susceptible of morbid impressions from a vitiated atmosphere on first coming to land in a sickly season.

As a common rule, regular sufficient diet affords some protection against the influence of malaria; and fatigue, low living, debauch, night-watching, and irregularity of every kind, favour its attack. In temperate climates, where these miasmata abound, the practice of over-excitement with stimuli will do less harm than in hot countries.

2. *Bronchocele*.—From the line in Juvenal, "Quis tumidum guttur miratur in Alpihus?" it would seem that the swelled throat was so common a complaint in the Alps in his time, as not to excite any wonder. It is still found in the valleys of the Alps, and in some other mountainous countries, as the Pyrenees, the province of Behar in India, in Derbyshire, &c. It has been observed also in some mountainous parts of Java and Sumatra; but it is rare in Scotland; and Dr. Reeve states that it is very common in Norfolk. Mungo Park observed the bronchocele in different parts of Bambara, in Africa, along the course of the river Niger. Females are far more liable to it than males. The opinion that snow-water is the cause of this complaint appears to be quite unfounded; nor can we ascribe it to the use of water impregnated with calcareous earth. Yet it is probable that air, water, and diet, each contribute something towards the cause. Sir S. Raffles tells us that there is a village, near the

foot of the Teng'gar mountains in Java, where every family is afflicted by this malady; while in another village, situated at a greater elevation, and through which the stream descends that serves for the use of both, there exists no such deformity.

In the province of Behar in India, there is a district called Tirhoot,* in which bronchocele is common among the natives: "and a singular circumstance regarding it is, that on a small river of the district it is not uncommon to see a village on each bank, and quite contiguous, the one with scarcely an individual exempt from the complaint, while in the other the inhabitants are perfectly free from it."

Dr. Johnson cogently remarks,† "that we observe goitre more abundant in some than in other parts of Switzerland, though the diet is the same. In the valley of the Rhone we see hardly any thing else than cretins and goitres; while, in the valley of Chamouny, separated only by the Col de Balme, we see very few of either disease. We trace bronchocele along the whole course of the Rhine, from Schaffhausen to Cologne; it gradually decreases as we descend the Rhine; and among those who inhabit the banks and drink the waters of the upper or turbid Rhone (in the Vallais) there are twenty goitres and cretins for one that can be seen on the banks of the lower or filtered Rhone." Taken in connexion with the Rhine, it forms (in his opinion) a strong ground of presumption in favour of the *goitri-factive* influence of Alpine waters. Dr. Johnson, however, does not ascribe all the effect to the waters; and he adds, that "English children (who live as well as people in England) cannot be kept long at Geneva without having enlargements of the thyroid gland." He concludes, therefore, that the cause cannot be traced to sour bread, as Dr. Brug imagined, or to any particular article of diet, except water.‡

Notwithstanding the foregoing testimonies, the observation of Dr. Mason Good is very important, that at Matlock in Derbyshire he found "a large number of the poor affected with bronchocele, while the rich escaped;" and by far the greater part were exposed to all the ordinary evils of poverty.§

Bronchocele has been observed to prevail most in situations where humidity is joined

* Calcutta Transactions, 1829, and Edinb. Med. and Surg. Journal, No. 106.

† Med. Chir. Rev. vol. vi. p. 422.

‡ In the work of this able writer and philosophic observer, lately published, entitled, "Tour of Health, &c." he says, "Dr. Bally, a native of a goitrous district in Switzerland, states the following very important fact. Bronchocele appears to me to be produced by certain waters which issue from the hollows of rocks, trickle along the cliffs of mountains, or spring from the bowels of the earth. That this is the case I may instance some families in my own country, Département du Lemau, au Hameau de Thuet, the use of whose waters will in eight or ten days produce or augment goitrous swellings. Such of the inhabitants of the above village as avoid those waters are free from goitre and cretinism."

§ See Study of Med. vol. v. p. 309.

with excessive heat; and it is found to increase in spring, and to diminish in autumn. Upon the whole, a more ample induction is required before the true causes of the complaint can be determined: the probability seems to be that these are not uniform, or, at least, that they are liable to be much varied; and that a peculiar combination of air, food, and water has much to do in causing the complaint.

3. *Cretinism*.—This singular compound of mental and physical deformity is found in situations, as in the Alps and Pyrenees, not unlike those which give rise to bronchocele, with which it is sometimes but not always complicated. It was first described by Felix Plater in 1635, who saw it in Carinthia and the Vallais about the time the rickets, with which it seems to be connected, was observed in England by Glisson. Cretinism was observed by Sir George Staunton in a mountainous part of Chinese Tartary.* A race of cretins has also been noticed by Ramond in the south of France, where they are widely extended, under the name of Cagotts.

The large deformed head; the low stature, the sickly complexion, the vacant and unmeaning countenance, the coarse and prominent lips and eye-lids, the wrinkled and pendulous skin, the loose and flabby muscles, are the physical characters belonging to the cretin, which correspond with an almost obscured or feebly glimmering intellect to form one of the most degraded varieties of our species.

According to Saussure, the valleys where cretinism is most frequent are surrounded by very high mountains, sheltered from the currents of air, and exposed to the direct, and still more to the reflected rays of the sun. The effluvia from the marshes are very strong, and the air is humid, close, hot, and oppressive. Dr. Reeve, who has given a very interesting account of this disease in the fifth volume of the *Edinb. Med. Journal*, says, that "all the cretins were in adjoining houses, built up under ledges of the rocks, and all of them very filthy, very close, very hot, and miserable habitations. In villages situated higher up the mountains no cretins are to be seen; and the mother of one of the children told me, of her own accord, that her child was quite a different being when he was up the mountain for a few days."† It is gratifying to think that the number of cretins is diminishing. It is well observed by Dr. Reeve, that "there is no fact in the natural

history of man that affords an argument so direct and impressive in proof of the influence of physical causes on the mind, as cretinism. It may be prevented by removing children from the confined and dirty places where it prevails, and nursing and educating them in the higher parts of the mountains." He further states, that the disease is looked upon as belonging to indigence and poverty; for, in every place where he saw cretins, many well-looking persons of both sexes resided, and these were, *without exception*, persons of a higher class in society, who lived in better houses, and could supply both their moral and physical necessities.

The production of cretinism by the bad quality of the air and food, the neglect of moral education, and other evils attendant on poverty, is sufficiently proved by the advantages that have attended the use of those prophylactic rules laid down by Foderé, in his interesting and classical work on bronchocele and cretinism. And the diminution of the number of cretins is ascribed to the draining of the fens, the more healthy situation of the huts, the clearing of the woods, &c., and, lastly, to the progress which has been lately made in education among them.*

4. *Plica, trichoma, plaited hair*.—No mention is made of this disease either by the ancients or Arabians. Whether it first appeared in Poland, in the thirteenth or the sixteenth century, is doubted by authors. Pistorius refers to the first period, Thuanus to the second. Though plica is more frequently observed in Poland and Lithuania (and less so than formerly) than in other countries, yet it is seen occasionally in Hungary, Transylvania, Prussia, Russia, and Great Tartary, as well as in Switzerland, Belgium, and some parts of France. It is, however, considered to be the endemic of Poland. Many marvellous stories are current in relation to this disease, not only about the causes and contagious nature of it, but the danger of attempting a cure. Whatever the disease may have been formerly, as to its violence and general tendency to supersede other morbid affections, in persons constitutionally or hereditarily liable to it, Alibert, De la Fontaines, Baron Larrey, and others have lately thrown much light upon the complaint, and have proved that inattention to cleanliness, and the peculiar habits of the Poles, have much to do with the occasional causes. Dr. Louis Kerckhoff† does not doubt that filth is now the cause of it, united to the constant habit of the lower classes in Poland of wearing long hair, which, in the hottest weather, none of them ever clean or comb, and keeping the head always covered either with a thick woollen bonnet or a leathern cap. To prove that it was not contagious, he inoculated himself and two children from the fluid filling the bulbs of the hair, which he had taken from a boy labouring

* See Good's Study of Med. vol. v. p. 334.

† A curious observation is made by Dr. Akerman on this subject. (See Dr. Thomas' Practice, p. 605.) "Those who inhabit the deepest and most reclusé valleys are reduced to the lowest state of imbecility and idiotism; in those who are somewhat more elevated, the mental powers are not so completely obtunded; and others, still more elevated, and of course less exposed to exhalations, will probably be deformed merely with wens or swellings about the joints, and other symptoms of rachitis. Those who are nearer to the summits are perfectly exempt from all these appearances." These facts show a very singular correspondence between degrees of elevation in those mountainous districts, and a graduated scale of disease lessening towards the summits.

* See Medical and Physical Journal, vol. v. p. 176.

† See Med. Trans. of the Col. of Phys. Lond. vol. vi.

under the complaint, without any effect. He and the French surgeons had no difficulty in curing the disease, in several instances, by cutting off the matted and filthy hair, and directing the head to be suitably washed. It must, however, be acknowledged that in some families there seems to be such a predisposition to the complaint that slight causes are sufficient to induce it, and in some cases even strong mental emotions have given rise to very sudden attacks of it.* Dr. Vicat† assigns three causes for this complaint. The first is the nature of the Polish air; the second unwholesome water, for the common people usually drink that which is nearest at hand, taken from rivers, lakes, and even stagnant pools; the third cause is the gross inattention of the poor to cleanliness, for the better class are far less liable to it than those of inferior stations; the inhabitants of large towns than those of small villages; and the free peasants than those in a state of vassalage. Dr. Kerckhoffs confirms the fact that the rich are generally exempt from plica, and that it is seldom seen but among the poor, “who wallow in filth and misery”—(qui croupissent dans la misère.)

5. *The Guinea-worm*.—Plutarch‡ states that those who live near the Red Sea are liable to a disease in which small worms, called *dracontia*, are found in various parts of the body. Kemper observed the disease in the island of Ormuz, in the Persian Gulph, and also in Tartary. According to Welsch, it is known to prevail among the negroes in all the marshy parts of Africa. The worm is a native of both Indies. Dr. Chisholm, who has given the fullest and best account of the dracunculus that we have seen,§ says that the complaint is not confined to the natives of Africa in the West Indies, and that it is an endemic, and, during a certain portion of the year, an epidemic disease, in the island of Grenada, where he practised. In one estate of this island all the field-negroes, about three hundred, who drank of a particular well, had the disease every year, in the months of November, December, January, and February, for several years, (or from the year 1787, when the well was dug, till 1794, when Dr. Chisholm left Grenada;) and from March to November not an instance of the disease occurred among them. In another plantation the same thing was observed, and after cisterns were made to hold rain water for common drink, and the wells were filled up, the disease entirely disappeared. The domestic negroes and whites who drank *rain* water, while the *well* water was in use, generally escaped. Three infants, from five to seven months' old, to whom their mothers had incautiously given the water of the well, had each a worm in one of their legs; and a domestic negro boy, who in the year 1793 drank of the *well*-water, had several Guinea-worms the same year, and *only that year*. In a third plantation similar facts

were noticed; none of the whites on the estate had the disease except one, who inconsiderately or ignorantly drank of the well-water.

Bruce and Mungo Park give a similar testimony respecting the effects of particular wells in Africa; and Dr. Chisholm concludes that “in all countries in which the dracunculus is endemic, the prevailing belief of the people is that it proceeds from drinking water which contains the ova or the embryo of the animal.”

It is a singular fact that the disease is observed to prevail at Bombay and along that part of the coast of India about the same time of the year when it prevails in the West Indies, viz. in the months of December, January, and February. It also appears in many other districts in the Carnatic and Madura, to within the distance of one or two days' journey from the sea-coast. A learned missionary, named Dubois, in a letter to Dr. Anderson, the physician general, states that he has often seen villages in which more than half the inhabitants were affected by it at the same time. The inhabitants of a village who drink water from one well are attacked by the disease, while the inhabitants at the distance of only half a mile who drink water from another well are not affected by it. Besides, the inhabitants living on the shore of the Cavary and other rivers, who constantly drink their limpid waters, are never visited by it; while those who live at the distance of one mile on both sides, and are obliged to drink the saltish water of wells, are all, or the most part, *yearly* exposed to it.

Dr. Smyttam* confirms the observations of Dr. Chisholm and others that “an argillaceous (*and tuffy*) soil, with a considerable impregnation of salt, or percolated by sea-water, is what the Guinea-worm affects.” And another fact seems to be pretty well ascertained, both in the East and West Indies, that the worm not only insinuates itself into the body *through the skin*, but that its ova may be conveyed into the system through the stomach, and deposited in the cellular membrane under the skin, where it attains its growth, and at length produces that local irritation which leads to its expulsion.

The fact that those who are affected with the dracunculus rarely suffer from any other disease at the same time, with a few other reasons which appear entitled to little weight, has led some persons, and lately Dr. Milne of Bombay,† to maintain the position that the substance which is observed in this disease “is not a worm, but a lymphatic vessel.” We cannot take further notice of this opinion, nor is it necessary to advert to the circumstances which led Sir James Macgrigor to conclude that the dracunculus was contagious, as the facts have been explained by Dr. Chisholm on a far more reasonable hypothesis.

The Guinea-worm has been rarely seen in its native state *out of the body*. Nevertheless, the observations of Dr. Helenus Scott of Bom-

* See Lorry, de Morb. Cutan.

† See Edinb. Med. and Phys. Dict. art. *Plica*.

‡ Sympos. cap. ix.

§ Edinb. Med. and Surg. Journal, vol. ii. p. 145.

* Calcutta Med. Trans. vol. i.

† Edinb. Med. and Surg. Journal, No. 106.

bay,* and recently those of Dr. Robert Grant,† set the question of its independent existence at rest.

6. *Nostalgia*.—The concurrence of depressing symptoms which sometimes arise in persons who are absent from their native country, when they are seized with a longing desire of returning to their home and friends and the scenes of their youth, constitutes the disease called nostalgia. Some have considered it peculiar to the natives of Switzerland, because it was often observed in the Swiss soldiers when on foreign service. But, alas! too many instances of this affection occur in the natives of other countries, and evince that it has its source in the very frame and constitution of human nature in every part of the world. Though it might appear that the inhabitants of mountainous countries were more liable to nostalgia than others, yet many instances have occurred in which a removal from the plain to the mountain has produced this melancholy. It would seem as if no country were too wild and savage, if but the simplest means of supporting human life were at hand, not to attach the natives to it. Our affections, like the tendrils of the vine, adhere to the objects that are first presented to them, whether animate or inanimate, with so firm an embrace that nothing but violence can break the connexion.

Every one accustomed to the variety and beauty of mountain scenery, and capable of feeling intensely the delights of rural manners, can conceive without difficulty the anguish and shock to the physical powers, which is often sustained by those who are thus ardently devoted to their friends and native country, when they have been rudely separated from them.‡ The Laplander feels the most enervating and listless despondency, when absent from his snowy mountains and frozen lakes. The North-American Indian sighs amidst the festivities and comforts of polished life for the earthy couch in his native wilds, and the free range of his interminable forests. And the poor negro, even if cruel bondage were not his portion, might be expected to utter bitter complaints for the loss of family endearments and of the noontide repose in the sultry retreats of African luxuriance. Many of the ill-fated Africans, it is well known, perish from *suicide* and *dirt-eating* in those polluted and polluting islands, where we cannot say that

“No fiends torment nor Christians thirst for gold.”

Even the hardy and almost unyielding nature of the British seaman, when he has just set foot on his native land after a long voyage, and been pressed against his will to leave once more the objects dearest to him in life, has often been subdued by this powerful influence so com-

pletely as to be quite disqualified for the duties to which he was called. Within the last forty years, perhaps no country in Europe has afforded so many instances of the overwhelming influence of the disease in question as France, notwithstanding the natural buoyancy of spirit and thirst after military glory for which that nation is distinguished. There was scarcely an encampment during the war in which the skill of the medical attendants was not called forth, assiduously and painfully, to counteract the pernicious effects of nostalgia,—pernicious, and, indeed, often fatal in a high degree, when any other debilitating or depressing powers were applied at the same time, and acting together with this epidemic melancholy upon the young soldier. It was then observed that a slight wound, dysentery, fever, extra fatigue, or a disastrous engagement, hurried multitudes into a state of mortal depression.*

7. *Tarantismus*.—A disease was formerly supposed to be endemic in Apulia, and only in that part of Naples, which was so called from the spider named *aranea tarantula*, whose bite was said to be the cause of it. The peculiarity of the disease mainly consisted in the uncontrollable propensity of the sufferer to dance in the most violent manner at the sound of certain music—some affected by one sort and some by another—till copious perspiration and excessive fatigue put an end to the disease, and thus destroyed the effects of the poison. This was the common opinion, and men of science received it as agreeing with matter of fact. Tarantismus affords one of those humiliating lessons which may too frequently be drawn from medical records, on the difficulty of ascertaining facts, and the prevalence of unfounded opinions, even among distinguished physicians. Kircher, Sir Thomas Browne, Baglivi, Boyle, and Mead have not hesitated to give credit and countenance to the statements relative to the wonderful effects both of the bite of the tarantula spider upon the body, and of the music as a remedy. Yet it would appear that they were all misled by a popular error. The treatise on the tarantula of a physician so eminent as Baglivi, who was himself an Apulian, tended to confirm the delusion.

On the contrary side of the question we have the strong testimony of Dr. Cornelio, a Neapolitan physician, so far back as 1672, of Dr. Serao, an Italian, and of Dr. Cirillo, professor of natural history in the university of Naples, so lately as 1770, besides that of many others since their time.† Cornelio says that “all those that think themselves bitten by tarantulas, except such as for evil ends feign themselves to be so, are mostly young wanton girls, who persuade themselves they have been stung by a tarantula, according to vulgar prejudice, in consequence of having fallen by some particular indisposition into this melancholy madness.” Dr. Serao has written an

* See *Medico-Chir. Review*, vol. iv. 1823.

† *Edinb. Med. and Surg. Journal*, No. 106.

‡ The celebrated Swiss air called *Ranz des Vaches*, imitating the full rebounding echo of the Alpine herd amongst the mountains, might well awaken mournful recollections in the bosom of the absent soldier, so as to require that the playing of it should be prohibited under a severe penalty.

* See *Percy and Laurent, Dict. de Sc. Méd. art. Nostalgie*.

† See *Phil. Trans.* for 1672 and 1770.

ingenious book, in which he has effectually exploded this opinion as a popular error. Dr. Cirillo asserts that, "having had an opportunity of examining the effects of this animal in the province of Taranto, where it is found in great abundance, he finds that the surprising cure of the bite of it by music has not the least truth in it. In Sicily, where the summer is still warmer than in any part of Naples, and in Tunis also, where this spider is found, the tarantula is never dangerous, and music is never employed for the cure of the pretended tarantism."^{*}

Dr. Laurent, who lived in the kingdom of Naples for a long time as chief surgeon to the French army, says that the bite of the tarantula does really cause a slight inflammation, but that tarantism, as described by authors, no longer exists. He has often seen, at Naples, ten or a dozen young girls running about the streets, each having a small tambour, and performing with a kind of violent effort, accompanied by the most wanton gestures, the dance they call tarantella, a national dance from time immemorial known in that country. Hence, Merat thinks it probable that tarantismus, *the disease*, is nothing but tarantella, *the dance*, adorned with some fables. Nollet, an eminent physician, was satisfied, when in Italy, that the vulgar notion was unfounded; that, even in Apulia, sensible people gave no credit to it; and that it was only some of the very lowest class, who, pretending that they were bitten, appeared to be cured by dancing and music, in order that they might gain a subsistence by this kind of imposture. We are assured that the opinion of all the physicians of the country is that the bite is harmless, if not aggravated by improper applications; and that they consider the pretended tarantism arising from it as visionary. Baglivi himself admits that "this spider is only venomous in the *dog-days*, and in very hot situations, for, *at other times, and in the mountains, and in other countries, it is not so.*" This is a remarkable concession.

The fact is, that the inhabitants of Apulia, breathing a hot and dry air, are liable to inflammations of the head and chest, and to spasmodic affections; and sufficient grounds appear for considering the aggregate of symptoms, called tarantismus, as a nervous complaint, incident to a people naturally choleric, ardent, impatient, liable to insanity, fond of a dance of which violent gestures constitute a peculiarity, and easily affected by music.†

Besides the diseases above noticed, some others are classed with endemics, as beriberi, attributed to the alternation of extreme heat in the day with cold and damp in the night; ophthalmia, in Egypt, to solar heat and an adust air imbued with impalpable sand; elephantiasis, in the same country, to corrupt water and the use of salt indigestible food amongst the poor, added to filth in houses and persons; pellagra, in Milan, and a species of lepra, in Asturia, to bad food and sordid

habits also; frambæsia, or yaws, in Africa, and among the negroes in the West Indies; tetanus and trismus in tropical climates, east and west; the Barbadoes, or Cochin leg, &c., to causes not well ascertained. Respecting each of these some interesting facts might be stated; but we have only room for a few general observations.

In the first place, we may remark that abject poverty is the soil in which most endemic diseases spring up in every country. Upon the poor, ill-fed, harassed population, living in closeness and filth, these diseases commonly fall, while those who live well and are but little exposed to the injurious qualities of air, soil, and water, are in great measure exempt. Secondly, if we may form any just idea of the causes of physical evils in general, from a consideration of the means which have been found useful in preventing them, then it is clear that, although some complex appearances and seemingly contradictory facts enter into the catalogue of assigned causes of many endemic diseases, so far as they appear to depend on air, soil, food, and drink; yet, on the other hand, proper attention to these things is found, in almost every instance, to be effectual in suspending and finally removing the maladies in question. By draining marshes and cultivating lands, by providing plain sufficient food and wholesome water, with airy dwellings for the poor, it cannot be doubted that a host of physical evils would be avoided. Thirdly, had we time to pursue this subject further, there is wide scope for reflection on the duties which devolve upon the rich in every country to relieve the necessary wants and sufferings of their poor neighbours; on the provision which is made in the nature of things, by a bountiful Creator, for the relief of human misery, in every climate and in all situations of life, if man himself, or at least those who are in power, would but apply the means—if luxury would make a small sacrifice of self-indulgence to the public good; and, lastly, on the physical blessings that would result from this wise paternal care, not only comforting and rejoicing the poor objects themselves, but enriching their benefactors, causing the face of nature to smile around them, and giving them the never-failing reward of sound policy and of Christian benevolence.

(T. Hancock.)

ENEMA. See INJECTION.

ENTERITIS. This term has been long used in medicine to express an inflammatory state of the intestines, but it is only within our own time that pathologists have attached any definite meaning to the expression. In the older books we read of *gastritis*, *peritonitis*, and *enteritis*, of which latter Cullen describes two species, the phlegmonous and erythematic; and it is remarkable that by a species of consent among medical men the term has been chiefly used to express the first of these species, or the acute inflammation of most if not all the coats of the intestine. But modern re-

* See Edinb. Med. and Phys. Dict. art. *Aranea*.

† Dict. des Sciences Méd. art. *Tarantisme*.

searches have greatly extended our views of enteritis, although the true pathology of the intestine is not yet sufficiently recognised by most practitioners.

Enteritis is now known as a disease perhaps the most protean of any of the affections of the body; occurring with every variety of intensity, from a slight and circumscribed vascularity to the most extensive disorganization; simulating by its numerous sympathetic irritations many of the diseases of the nervous, respiratory, circulating and genito-urinary systems; accompanied by the most violent symptoms of irritation, or only pointed out by a profound adynamia; or, lastly, advancing with perfect latency to incurable disorganization. A formidable disease in its idiopathic form, its supervention in the course of other affections is a matter of daily occurrence, and in one particularly, (fever,) a common cause of its fatal termination. We shall dwell on this part of the subject hereafter, and endeavour to show that the enteritis of typhous fever is more a consequence than a cause of the disease, but still not the less important in its prognosis and treatment. Compared with other affections, both acute and chronic, the frequency of intestinal disease must strike every observer. Andral, who, from his vast experience, and the fact of his having no theory to defend, is the best authority on this subject, declares that in the great majority of acute diseases of other parts, a derangement either in the functions or structure of the intestinal canal will occur; and that in chronic diseases, whatever be their nature, it is extremely rare that the digestive tube escapes alteration. These complications of course form part of our subject, but here we shall merely remark that it is difficult to estimate the benefit which Broussais has conferred on medicine by calling the attention of pathologists to the frequency and importance of irritations of the digestive system; and if, in the ardour of discovery, this great physician has in one instance passed the bounds of strict induction, the error is more than atoned for by the extensive good of which he is the undisputed author.

We shall here treat of the different inflammatory affections of the intestinal canal, from the pyloric end of the duodenum to the rectum, reserving the consideration of gastritis and peritonitis for separate articles.

We recognize inflammatory affections of the digestive tube by the alterations of function, the local phenomena, and the sympathetic irritations which occur. The general symptoms may be enumerated as follows: indigestion, anorexia, vomiting, thirst, jaundice, tympanitis, constipation, alteration of the fecal discharges in quality or quantity; pain, tenderness on pressure, contraction of the features, morbid state of the tongue, dryness of the skin, and conjunctiva; suppression of urine, sighing, stupor, delirium, headach, prostration, accelerated and thoracic respiration, fever.

We shall find that the greatest variety in the combinations of these symptoms may occur, principally arising from the following circumstances:—the intensity and extent of the inflam-

mation;—the situation of the disease, both as to the different parts and tissues of the tube;—the complications with other diseases;—the different degree of excitability of the nervous system in different individuals. Thus, when the inflammation is extensive and severe, occupying both the stomach and intestines, we may have the worst forms of bilious or gastric fevers; when it occupies the duodenum, jaundice is a common symptom, and the disease may occur with or without fever: in the small intestine a slight inflammation is often nearly latent, or only pointed out by a little swelling or pain, while in the cæcum or colon the disease produces all the varieties of diarrhoea and dysentery. When the upper portion of the tube is engaged, constipation is a common symptom; when the lower, the reverse takes place. If the mucous membrane alone is engaged, pain and costiveness are often absent; but when all the coats are in a state of acute irritation, we may find the most violent symptoms of peritonitis and ileus, with contractions, intus-susceptions, &c. The complication of the disease with other affections also produces great varieties. Thus when it occurs in the advanced stages of phthisis, diarrhoea is often the only symptom; or when complicated with erysipelas or pneumonia, its most prominent indication is an extraordinary prostration. The different degrees of excitability of the nervous system cause the greatest irregularity of symptoms: in the child, acute enteritis is commonly mistaken for inflammation of the brain; in the adult a circumscribed irritation will in one case be accompanied by violent delirium, while in another, more severe, this symptom shall be completely absent.

We have already spoken of the great frequency of abdominal irritations occurring alone, or in combination with other affections. This knowledge is the discovery of our own time, and may be looked on as the greatest improvement in modern pathology. The humoral school could see in most digestive derangements nothing but the accumulation of sordes; and hence the emetic and purgative practice, in cases where a decided inflammation existed in some part of the tube. They never thought of treating inflammatory diseases of the abdomen as such, unless when they occurred in the highest degree of intensity, involving all the coats of the intestine; and of the nature and symptoms of irritations affecting the mucous system they were almost wholly ignorant. The followers of Brown, on the other hand, saw in these affections only debility, because most of them are accompanied by prostration of strength, functional injury, a weak pulse, and in some cases by completely typhoid symptoms. Ignorant of the fundamental law of pathology, that local excitation or inflammation may coincide with a diminution of the general vital force, they prescribed stimulants, which only increased the debility by exasperating its cause. The progress of medicine has shewn, that to various modes and shades of irritation of the gastro-intestinal surface, a great number of affections, the nature of which was previously obscure, are

to be referred. We now know that many cases of what has been called idiopathic fever are of this nature, and that it is a common source of dyspepsia, hypochondriasis, jaundice, hepatic obstructions, and tympanitis; that diarrhoea and dysentery constantly arise from it; and that in very many cases ileus, constipation, infantile remittent, tabes mesenterica, melæna, and hemorrhage from the bowels, are results of this morbid state. To this cause also may be traced many of the irritations of other systems: it may produce hysteria, epilepsy, tetanus, mania, cough and accelerated breathing, palpitation, suppression of urine, dropsy, rheumatism, and disease of the skin.

We shall endeavour to study the history and symptoms of enteritis separately from those of gastritis, as far as this is possible; for in many cases the coincidence of the two affections prevents this analysis. We shall examine first the *acute and chronic enteritis of the infant*; and, secondly, these affections in the adult. Enteritis may be an intra-uterine disease; and it appears probable that many of those infants who continue in a state of debility and marasmus from birth, have really been born with this affection. In some infants who have died but a few days after birth, unequivocal marks of chronic inflammation of the intestine have been found; and in others who have lived but two days, the various appearances of more acute irritation have been observed. These facts render it probable that the delicacy of infants may often be owing to this cause, and should render practitioners much more cautious in the use of the tonic, stimulant, and purgative treatment.

During the period of lactation, infants are extremely subject to inflammation of the mucous membrane of the intestines, a circumstance attributable to the high degree of susceptibility which the tube is endowed with, and the great activity of the digestive function; and in most countries also, the irregularities of diet, and the frequent use of stimulants and purgatives powerfully aid in producing this result.

Enteritis may occur in the infant under two principal forms: in the first there is absence of fever, and frequently of the other sympathetic irritations, the symptoms being merely local: in the second we have the local symptoms, but with fever and signs of irritation in the nervous and respiratory systems. The first form is that to which the youngest infants are most subject, the second being more liable to occur as the child advances in age. As in the adult, the symptoms vary with the portion of the tube affected, and in the youngest children they are most commonly those of gastritis and enteritis. Vomiting, diarrhoea, tympanitic swelling and pain on pressure are the most common symptoms of this disease. The tongue is most generally dry, furred, and red at the tip, and the skin dry; and when diarrhoea exists, an erythematous redness round the anus has been observed. Fever may or may not be present, and it often happens that the abdomen feels preternaturally hot. Towards the fatal termination of the disease the skin becomes cold, wrinkled, rough, and of a dirty appearance; the emaciation

is extreme, and the muscles are soft and flabby. The character of the face is remarkable; the hollow cheeks, corrugated forehead, and retracted mouth giving to the child a melancholy and singular expression of age and suffering.

Dr. Abercrombie describes this disease in children of from six to eight months old, and states that in its early stages it is difficult to distinguish it from the ordinary bowel complaints of children at the period of dentition. He relies principally on the occurrence of fever, but we have seen that in the very young child this is insufficient, the symptoms being merely local. The following is his account of the symptoms:—"The infant is usually hot and restless in the early stages, with thirst; and the tongue is dry, or covered with a brownish crust: there is in general a good deal of screaming and fretfulness, disturbed sleep, frequently vomiting, and in many instances pressure on the abdomen appears to give uneasiness. The bowels are loose, but this is not in every case a prominent symptom, for even in the advanced stages the bowels may not be moved above three or four times in the twenty-four hours, while the disease is advancing rapidly to a fatal termination. In other cases, however, this symptom is more urgent, the evacuations being preceded by much restlessness and appearance of pain, and the matters evacuated are sometimes discharged with a remarkable degree of force, so as to be propelled to a considerable distance. The evacuations vary considerably in appearance, and I have never been able to satisfy myself that any reliance is to be placed upon them in ascertaining the disease. They sometimes consist chiefly of a reddish brown mucus, sometimes of a pale clay-coloured matter, and sometimes of a dark watery fluid; but in many cases they shew little deviation from the healthy state, while in others their appearance is evidently disguised or modified by articles of nourishment, which pass through nearly unchanged. The disease often goes on for some time without exciting alarm or being distinguished from an ordinary diarrhoea, until attention is suddenly directed to it by the occurrence of constitutional symptoms. These consist in some cases of a great degree of febrile oppression, with dry crusted tongue, thirst, and vomiting; in others, of a very sudden and rapid exhaustion of the vital powers, which is unexpected, and not accounted for by the frequency of the evacuations; and sometimes the first appearance of unfavourable symptoms consists in the occurrence of coma, with a peculiar hollow languid look of the eye, and a pale waxen aspect of the whole body, while the pulse perhaps continues of tolerable strength. These symptoms may appear while the disease has been going on but for a short time, and while the evacuations have been by no means frequent; while the affection, in short, had not been distinguished from the ordinary bowel complaints of infants."*

Billard has observed out of eighty cases of inflammation of the intestinal tube in infants at

* On Diseases of the Stomach, &c.

the breast, *thirty* of inflammation of the small intestine and colon; *thirty-six* of the disease in the small intestine alone; and *fourteen* cases of inflammation of the colon. In twenty of the first set there was bilious diarrhoea, and in all swelling and tenderness of the belly: in twelve cases bilious vomiting took place, although there was no gastritis: in all, the erythematous redness round the anus occurred; the tongue was in most cases red and dry, and the skin very hot and arid; but the pulse was rarely excited to any febrile degree, and was frequently feeble. In the thirty-six cases where the small intestine was alone engaged, there were instances of vomiting in twenty; and in fifteen of these latter the disease was situated in the ileo-cæcal region and valve. The belly was in all, at some period of the affection, tympanitic. In twenty-five there was purging of a yellowish matter, and of a substance resembling meconium; the tongue was almost always red, the skin hot, but the pulse little excited. In these cases also the erythema around the anus was generally observed. The fourteen cases of inflammation of the colon were all accompanied with diarrhoea, the tympanitis was much more slight, and in six of the cases only did vomiting take place. There was commonly great agitation, and a remarkable dryness of the skin, which was generally cold and livid. The pulse was scarcely excited.*

From these important observations it would appear that the tympanitis, vomiting, and diarrhoea are the principle signs of the inflammation of the mucous membrane of the small intestine, while in the simple colitis it is most commonly indicated by a diarrhoea, attended with but little swelling of the belly.

The absence of excitement of the pulse in these cases is a point of great practical importance, showing how guarded we should be in any case of intestinal disturbance during the period of lactation. This proposition then appears fully established, that in the infant at the breast fatal enteritis may occur without fever, and commonly without excitement of the pulse.

We must never lose sight of this fundamental principle of diagnosis as applied in particular to the enteritis of children, that *no one symptom is sufficient to point out the disease with absolute certainty*. A child may have vomiting alone, or diarrhoea alone, or colicky pains without enteritis. The occurrence of any one of these with fever is indeed a nearly unequivocal indication of inflammation; but, as we have seen, fever may be absent, and then, as to diagnosis and practice, it is to the group of phenomena that our attention is to be directed. And it should further be borne in mind that although the symptoms of vomiting, diarrhoea, and pain, taken singly, sometimes cannot be connected with a state of inflammation, yet that in most cases they are really owing, if not to this condition, at least to an excited degree of action and irritability which demands the same principles of treatment.

The sympathetic irritations which are most prominent in cases of the enteritis of children,

are those of the respiratory and nervous systems. It is of the greatest importance that these should be well understood. It appears that although at first they are not necessarily accompanied by organic changes in the parts, yet that in most cases these will sooner or later occur, and an organ, at first only sympathetically irritated, become at last really inflamed. We may then have a true revulsion of disease, or what is more common, a new visceral inflammation, in combination with the original disease. The child may then have bronchitis or pneumonia, or arachnitis, or encephalitis, together with the primary enteritis.

We have often seen children who were supposed to be labouring under severe pneumonia, from the great acceleration of breathing and fever, yet on examination by percussion and the stethoscope have found either that no disease existed in the chest, or that there was a slight bronchitis, not sufficient to account for the symptoms. In most of these cases the patients had been treated for pulmonary inflammation, and without success; and with scarcely an exception the symptoms have yielded to the application of leeches to the belly, the use of cold drinks, and the avoiding every thing calculated to irritate the gastro-intestinal surface.

The symptoms of cerebral irritation are more common as a result of enteritis in the child than in the adult. We may observe all the ordinary signs of acute inflammation of the brain, such as pain, delirium, coma, &c., and yet on dissection, this organ be found without appreciable lesion, but the digestive tube highly inflamed; and it is the opinion of some of the best pathologists, that in the infant the most common cause of hydrocephalus is a primary irritation of the digestive tube. On the other hand, we know that symptoms of abdominal disease will arise from an encephalitis; but of the two cases, the former appears to be the more frequent.

There are three affections to which children are extremely liable, the essence of which appears to consist in an inflammatory state of the digestive tube; these are the *weaning brash*, the *infantile remittent*, and *tabes mesenterica*. It is now satisfactorily proved that a diseased state of the mucous membrane is the principal pathological phenomenon in these affections. The study of the symptoms, the history of the exciting causes, and the appearances on dissection, all go to establish this doctrine, which is not new, but by no means sufficiently recognised by medical men. The first of these is manifestly an acute enteritis, produced by the change of food, and in which nature seeks to relieve the inflammation by a super-secretion; and hence the danger of the too sudden suppression of the evacuations, which lights up fever, and is commonly followed by cerebral symptoms. The phenomena of the second are all referable to a less violent irritation, but one which, if not relieved in time, will destroy life with the symptoms of *tabes mesenterica*, or if exasperated by improper treatment, may run the usual course of more violent inflammation. It may be objected to this view of the disease, that it is often relieved by the purgative plan;

* *Traité des Maladies des Enfants.*

but the reverse often occurs, and we constantly meet cases of *tabes mesenterica*, where the first symptoms were those of the infantile remittent, and in which this mode of treatment has altogether failed. This apparent paradox admits of explanation: where the first symptoms come on in children who have been over-fed, or have used highly indigestible articles of diet, the use of purgatives in the early stages may and does effect a cure by the evacuation of the noxious substances; but there is a period beyond which this treatment cannot be pushed with safety, and if the symptoms do not yield to the use of laxatives, different means must be adopted. These are means calculated to relieve inflammatory action in the mucous membrane, a state, the existence of which is proved by the appearances on dissection, which include all the effects of inflammation on the digestive tube.

The pathology of *tabes mesenterica* is not yet completely cleared up; but the following circumstances are almost decisive in favour of the opinion that it arises in most cases from chronic enteritis.

First. The mesenteric glands may become enlarged, inflamed, and suppurated in cases of acute and chronic enteritis both in the infant and the adult. *Secondly.* The great majority of cases of this affection have commenced with symptoms of enteritis. *Thirdly.* The dissections of most cases have shown an inflamed and ulcerated state of the mucous membrane. *Fourthly.* The treatment which is found most efficacious is that calculated to remove this condition of the intestine.

It is true that a few cases are to be met with where the enlarged and tubercular state of the mesenteric glands cannot with certainty be traced to enteritis; where in fact the mucous membrane does not present any trace of disease. These appear to be examples of a general disposition to tubercular degeneration of the glandular system, and are exceedingly rare as compared with the others. The absence of vascularity in the mucous membrane may in some instances arise from revulsion, such as would occur from a new and violent inflammation of some other organ; and we have seen cases where it would be attributed to mere anæmia, from the extreme emaciation of the patient. This pathology of *tabes mesenterica* was first developed by Broussais, in his *Examen des Doctrines Médicales*, in the year 1816, where he declares that the tumefaction of the mesenteric glands arises from enteritis, in the same manner as bubo in the groin arises from chancre. In this disease the fever was attributed to the engorgement of the mesentery, when in fact both of these were secondary phenomena; the true cause was not understood, and hence the uncertain and erroneous treatment of the affection.

As we should expect, this result of enteritis is much more common in subjects of the strumous constitution, or, in other words, in those where the lymphatic system is predominant. Hence the reason of its greater frequency in children, and, when occurring in the adult, in the scrofulous constitution.

Two important facts are stated by the above

author in reference to *tabes mesenterica*; one, that it has been observed to be more frequent during moist seasons; the other, that simple peritonitis will not produce the disease.

Enteritis in the adult.—In describing this form of the disease we find the same difficulty in separating its symptoms from those of gastritis, on account of the frequent combination of the two affections. We still want a series of cases, observed with a view to this particular point, which, however, is not of very great practical importance; for the existence of inflammation being recognized in the digestive tube at any point of its extent, the general principles of treatment are essentially the same.

We have already stated that the symptoms are found to vary with the portion of the tube affected; thus in the following affection the phenomena are often peculiar.

Duodenitis.—This may be an acute or chronic disease, and rarely occurs without more or less of inflammation of the stomach. Hence the term *gastro-duodenitis*. It is now pretty generally admitted that irritations of the stomach and duodenum have a powerful effect in inducing either functional or organic disease of the liver. Indeed, in the opinion of some pathologists, hepatic disease is almost always secondary to this state, a doctrine however which is too sweeping. But it appears certain, that in the notions hitherto received of affections of the liver, the influence of *gastro-duodenitis* in their production has been greatly overlooked: thus, when jaundice supervenes in the course of a *gastro-enteritis*, we may diagnosticate inflammation of the duodenum in most cases, and we shall find that to this lesion are to be attributed a great number of examples of icterus. This duodenitis is quite sufficient to produce the jaundice, independent of any mechanical obstruction to the flow of bile, or the occurrence of an acute inflammation of the liver; and the yellowness appears to arise either from the direct transmission of inflammation along the ducts, or, according to Ribes, by the branches of the porta, or, what is more probable, from the sympathetic irritation of the liver, an irritation which will produce a complete jaundice, without arising to the degree of actual inflammation of the organ. This is the doctrine of Broussais; but the fact that many cases of the most acute hepatitis will occur without jaundice, renders it probable that we must seek some other cause than the mere degree of irritation, to explain the phenomenon.

In the third volume of the Dublin Hospital Reports, Dr. Marsh details several cases of this form of jaundice, and insists on the importance of the state of the intestinal mucous membrane. In his cases, the usual cause of the affection was the drinking of cold fluids when the body was much heated, or the sudden and repeated exposure of the surface to cold after a similar state,—causes, among the most powerful in inducing *gastro-intestinal* inflammation. He there instances, also, the patients were generally ailing for some days before the jaundice occurred, and the symptoms were, those of a disordered state of the mucous membrane. The first case detailed presented

the disease completely predominant in the digestive tube. This state was pointed out by the symptoms, which were a deeply florid tongue, unquenchable thirst, epigastric tenderness, anorexia, or at other times a canine appetite, great prostration, rapid emaciation, and dysentery. We have seen jaundice apparently connected with an acute inflammation of the gastro-duodenal surface, under two circumstances. An individual is seized, after an excess at table, or other exciting causes, with symptoms of fever with decided indications of an irritated state of the stomach. There is prostration, thirst, general pain, vomiting, anorexia, foulness of tongue, diarrhoea, or constipation. The epigastrium is generally tender, somewhat full, and a dull pain is often felt in this situation. These symptoms may continue for a time, varying from a few hours to several days, when the patient becomes deeply jaundiced. At this time the heat of skin may subside, but the prostration generally continues much longer. By judicious treatment this case generally does well, but if not relieved the affection may be fatal; and in the great majority of cases, death takes place more by an extension of disease through the intestinal tract, or by sympathetic irritation of the brain, than by the production of an acute hepatitis. This appears to be one of the most frequent forms of jaundice; and the symptoms, as to intensity, may vary from a very slight to a severe disease, accompanied with remarkable indications of irritation of the nervous system. Coma is a frequent and most unfavourable symptom; and we have observed delirium and tetanic shocks to occur.

The second case in which we have seen jaundice connected with an inflamed state of the gastro-intestinal mucous membrane, was observed in a good many instances during the last epidemic of fever in Dublin. In the Meath Hospital, Dr. Graves and the writer of this article treated many of these cases, which from the dreadful severity of their symptoms, and their almost complete analogy with the yellow fever, excited the greatest interest. Of this fatal form of disease, the following description is abridged from the report of the Meath Hospital, printed for the use of the students of that institution.

"In all the cases, symptoms of gastric fever, of greater or less intensity, preceded the yellowness for a few days, and, without an exception, the supervention of the jaundice was ushered in by a great exacerbation of the symptoms of gastro-intestinal inflammation. The patient, often without any premonitory indications of the approaching danger, became seized either with spasms of the abdomen, called by the nurses "*twisting of the guts*," a name which agreed singularly with the morbid appearances found after death, or with merely hardness and extreme tenderness of the epigastrium and hypochondria. This hardness, accompanied with a knotted feel of the abdominal muscles, was speedily followed by universal jaundice, general uneasiness, anxious expression of countenance, a hurried pulse,

cold extremities, and death, commonly within twenty-four hours from the appearance of the jaundice. About one-half of the persons so affected, raved and betrayed great restlessness, while the remainder seemed in perfect possession of their intellectual faculties to the last, but at the same time appeared in a most nervous, irritable, and desponding state of mind. They could not rest for a moment tranquil, but tossed their arms about and looked at their attendants with an expression of suffering and despair. Most of them vomited, and in two cases a matter resembling coffee-grounds was discharged from the stomach and bowels. The tongue was parched, and in some instances covered with a black coating; and in one patient, the attempt to swallow produced general spasms. In all, the most exquisite tenderness of the epigastrium existed; and in several the tip of the nose became purple, giving to the countenance a truly frightful appearance, particularly when it spread from the nose to the upper portions of the cheeks. This change was preceded by pallor and coldness of the part; this was succeeded by a leaden hue, and in twelve or twenty-four hours the purple hue was complete. The toes were in some cases similarly affected; and where the patients recovered, a partial destruction of parts resulted from the disease. On dissection the appearances in all the cases were remarkably similar. The mucous membrane of the stomach and duodenum was found in an intense state of inflammation, which also extended more or less into the small intestines, where numerous recent intussusceptions were constantly found. The spleen in almost every case was greatly enlarged and softened, but in none did we find evidences of inflammation of the liver, or obstruction of the gall-ducts. Slight yellowish effusion below the arachnoid was found in several cases; and in one there was a remarkable dryness of the arachnoid. Such were the appearances in about fifteen cases of this disease. There were some cases in which general convulsions were reported to have occurred, but we could not corroborate this by personal observations. In every case a general hardness and knotted feel of the abdominal muscles, with extraordinary tenderness of the epigastrium and hypochondria, were observed. This was often so extreme as to make us suspect the existence of peritoneal inflammation; yet on dissection no instance of this lesion occurred. The bad symptoms generally came on without any indication of the approaching danger; the intestinal spasms being speedily followed by general jaundice of various degrees of intensity; and in the fatal cases death took place in a space of time varying from six to twenty-four hours. In every instance the patients suffered from extreme thirst, and there was nausea, and frequently vomiting, and in one case the genuine black vomit occurred for some hours before death."

With respect to the cause of the jaundice in these cases, we are more disposed to connect it with the severe gastro-intestinal inflammation than with any other lesion. Perhaps, the vio-

lent spasmodic action, by constricting the orifices of the ducts, might have had some effect; but the fact that many of the patients had bilious stools, and our commonly finding bile in the intestines, is against this supposition. That it did not depend on hepatitis is certain, as in no case did we find marks of inflammation in the liver. That the liver in such cases is more or less irritated is probable from the sympathy which it possesses with the gastro-intestinal mucous membrane, but in both cases this irritation is secondary, and seldom amounts to actual inflammation. In one case hepatitis was observed, but the patient was not under our care; and symptoms of suppuration of the liver, with discharge of the matter through the lungs, occurred in one of our convalescent patients. In this case perfect recovery followed. In no instance did any of the attendants of the hospital contract this form of fever; from which circumstance we conclude that the change of character did not increase the contagious nature of the disease.

In this country, where it is so usual to attribute many complaints to affections of the liver, it is of great importance that the connection which commonly exists in the relation of cause and effect, between irritations of the upper part of the digestive tube, and derangements of the hepatic function, should be carefully studied. It is true that gastro-duodenitis may exist without jaundice, or that hepatic inflammation may arise independent of disease in the mucous membrane; but it is equally true that the symptoms of gastro-duodenitis, both acute and chronic, are those commonly received as indicative of hepatic disease; and that this last affection may commence by inflammation in the digestive tube. These principles must be borne in mind; and in the treatment of such affections, if any doubt exists as to the diagnosis, it is better to give the patient the advantage of that doubt; to treat the patient for gastro-duodenitis before we have recourse to the hazardous modes supposed to be useful in hepatic disease. It constantly happens that cases of chronic gastro-duodenitis are treated as disease of the liver. This, if proper practice was pursued, would not lead to any serious injury, as the principles of treatment in both affections should be essentially the same; but where purgatives and mercurials are blindly lavished, without regard to the state of parts or the constitution of the individual, the distinction becomes of no slight importance to the safety of the patient and the character of medicine.

Inflammation of the jejunum and ileum.—It is difficult to lay down the symptoms of this affection from its frequent combination with disease in the stomach and colon; but where the disease is predominant in this part of the tube, the symptoms are generally the following: thirst, often without any vomiting, tympanitis, tenderness on pressure, pain, when present, not severe. In fact, if we abstract the symptoms of irritation at the upper and lower portion of the tube, such as vomiting and diarrhoea, we may have the remaining signs of

intestinal inflammation arising from this cause. It would, however, be wrong to conclude that vomiting and diarrhoea always point out an extension of disease to the stomach and colon; the contrary is the fact; but as a general rule the existence of these symptoms should lead us to suspect that the disease is not confined to the small intestines alone.

When the disease is severe, we commonly observe stupor, a red tongue, great thirst, tenderness on pressure, tympanitis, which is often excessive and occurring at an early period of the case, tenderness on pressure principally observable in the hypogastric and iliac regions. Diarrhoea may be present or absent, but the latter is, we believe, the most frequent case. The pulse is generally small and frequent, and the features are contracted. In a case of inflammation of the ileum in its lower third, which lately came under our notice, the abdominal symptoms were great tympanitis, pain on pressure, and thirst, without vomiting. In the commencement of the case there was some diarrhoea, but this soon subsided, and was succeeded by constipation. On dissection, the stomach and colon were found perfectly free from vascularity; but the lower portion of the ileum presented a vast number of extensive ulcerations. In this case, the absence of vomiting and of diarrhoea in the more advanced periods is extremely interesting, as connected with the healthy state of the stomach and colon. We have more than once observed, in examining the bodies of phthisical patients who never had diarrhoea, that the ulcerations and other marks of inflammation were confined to the ileum alone. In the present state of our knowledge it appears that, in cases of inflammation of the ileum, the absence of vomiting and diarrhoea seems to imply a healthy state of the stomach and colon; but on the other hand, these symptoms may occur independently of disease in these portions of the tube.

The symptoms arising from sympathetic irritation vary with the idiosyncrasy of the patient and the intensity of the disease. There may be a violent continued fever, a remittent or hectic fever, or a completely apyrexial state. We have known one case where the most prominent symptom was so violent an excitement of the heart as to lead to the belief that pericarditis and hypertrophy of the organ existed. In the Meath Hospital we have often observed increased pulsation of the abdominal aorta in these cases, a symptom which has not been sufficiently attended to. Here the excited state of the vessel seems analogous to that of the radial artery in cases of whitlow, and may be perceived even where the belly is not collapsed. Under proper treatment this subsides, with the other signs of abdominal irritation.

In the inflammation of the small intestines in the adult, cerebral excitement is generally not so prominent a symptom as in that of the child, nor is it so often followed by structural disease of the brain. It is sometimes very difficult to say whether the symptoms of irritation of the brain, under these circumstances, are really indicative of actual inflammation of

that organ. Andral relates a case where the patient, aged 35, was attacked with pain of the head, followed by great loquacity and exaltation of ideas, and other symptoms of cerebral excitement. The tongue was natural, and the abdomen *soft and not painful*. He had soon after furious delirium, and indications of strong determination to the head. Copious general bleeding, and the application of leeches to the neck produced no alleviation; and the patient expired suddenly in the midst of a general spasm. The only local symptom of an affection of the bowels during the disease was a slight diarrhœa. On dissection the brain and its membranes were found perfectly healthy; but the lower third of the ileum was in the state of acute inflammation.

Other instances of anomalous symptoms might be quoted. In many cases the disease is termed simple continued fever, and extensive destruction may be going on without the occurrence of any decided local symptom. The affection, however, should be suspected, if in addition to the general symptoms there is much thirst, tympanitis in the early stages, and irregularity of the bowels, which are sometimes constipated, or the contrary; the state of the evacuations does not afford much information, as fatal cases have occurred where they continued perfectly natural. It is in these cases that the excess of the system of purgative treatment is so liable to do injury. We believe that many patients are thus lost; ulcerative perforation being induced, or the disease aggravated and extended to the colon. We have also constantly seen the exhibition of turpentine, with the intention of relieving the tympanitis, produce the very worst consequences. As a general rule, this substance should never be exhibited in the early stage of a febrile affection where tympanitis exists. This is the disease described by Petit, under the name of the *entero-mesenteric fever*, of which the following accurate description should be borne constantly in mind. "There is at first a feeling of debility and general illness, with anorexia and irregular attacks of fever, but more often diarrhœa. The countenance is expressive of prostration and dejection; the eye dull, and the skin pale and livid, particularly about the lips and the *alæ nasi*; decubitus on the back; disinclination to motion; skin dry and harsh; torpor, and a certain degree of prostration of the intellectual faculties. The fever is obscure in the course of the day, but gradually comes on in paroxysms, without rigors or much heat, but with injection of the eye and slight delirium; there is great thirst, the teeth are dry, and the tongue is covered with a greyish paste: the stools are bilious or serous, variable in their frequency or abundance, but not sufficient to account for the prostration of the patient; belly soft and not swollen; little or no pain, but on pressure pain is felt generally on the right side, between the umbilicus and crest of the ileum: there is retraction of the lips and *alæ nasi*. The symptoms gradually increasing, we observe the cheeks to become livid, the eyes are sunk and injected, and somnolence and delirium

become constant, although the answers of the patient, though painful, are correct. Petechiæ, subsultus tendinum, and continued fever, with nocturnal exacerbations, supervene; the pulse is frequent and easily compressed; the teeth are covered with sordes, and the tongue with a brownish or black crust; the belly becomes more painful, the pain being sometimes still confined to its original situation, and without tympanitis, at other times more extended and with meteorism. The alvine evacuations become serous, fetid, and frequent, and the urine is scanty. Excoriations of the nates commence, and where the patient has been blistered there is a tendency to gangrene."

On dissection, the digestive tube is generally found healthy until we arrive at the middle of the ileum, which presents all that class of appearances constituting the *exanthème interne* of the French pathologists, the *dothin-enteritis* of Bretonneau.

This disease appears to be a common cause of what is termed an imperfect convalescence in fever. A patient, after suffering from fever for some time, becomes so much improved, that a speedy convalescence is hoped for; but in a few days it is found that strength is not returning, the pulse continues quick, and the appetite, though sometimes restored, is more often deficient and capricious. A degree of stupor comes on, and there is an occasional flush on the cheek. Under these circumstances there is often reason to suspect this disease of the ileum, which may go on insidiously to a fatal termination, or suddenly destroy life by ulcerative perforation. Dr. Cheyne describes these cases in his Report of the Hardwicke Fever Hospital for 1817, from which we extract the following important remarks:—

"In these cases the distress of the patient often bore no proportion to the danger he was in; the former was very little, while the latter was extreme. The disease would proceed without violent symptoms; nay, a patient would seem to be recovering, although without any critical discharge: he would call for full or middle diet, and for days take his food regularly. The only circumstance in his situation which demanded attention was that he regained neither strength nor flesh; he expressed no desire to leave his bed. Then his pulse again became quick and his tongue dry, and he would complain of *dull pain and uneasiness in his belly*, attended with soreness on pressure, and a degree of fulness in the upper part of the abdomen. Then came on a loose state of the bowels and great weakness: probably at the next visit the patient was lying on his back, with a pale sunk countenance and a very quick feeble pulse; his mind without energy. Then the stools (*mucous*) passed from him in bed, and the urine also; perhaps a hiccup came on; next his breathing became frequent, in which case death was at no great distance. Attempts to check the diarrhœa by astringents and opiates, or to rouse the patient by cordials, were alike unavailing; such remedies only seemed to accelerate death."

Dr. Cheyne states that in all these cases the

mucous membrane and glands of the intestine were found in a state indicating decided inflammation during life. See also *Andral, Clinique Médicale*.

The history and symptoms of inflammation of the large intestine, *colitis*, are described in the article *DYSENTERY*, to which we refer.

The foregoing view of the symptoms of inflammation of the mucous membrane of the intestine will suffice to give a general idea of the disease, of which, however, there are many other modifications. To enter more fully into these would occupy too much space, and hence we shall pass at once to the consideration of the pathological anatomy of the digestive tube. Now, in order properly to estimate the morbid, it is necessary, in the first instance, to take a view of the healthy condition of this organ.

It is now demonstrated that a great variety of shades of colour may exist in the mucous membrane, independently of any diseased action whatsoever. The situation of the part, the age of the patient, the process of digestion, and the length of time after death, will all modify the colour of this tissue. Its natural colour, however, may be stated to be greyish-white in the duodenum and jejunum; the greyish tint diminishes to the end of the ileum, and in the large intestine the colour is white. This may serve for a general description. When we examine the intestinal mucous membrane of the fetus, we find it of a rosy colour, which diminishes after birth; in youth, the white colour becomes gradually less vivid; and as the individual advances in age, the greyish tint becomes manifest.

The mucous membrane, however, is seldom met with so slightly coloured, and when we speak of the value of redness as a sign of disease, we shall examine the various sources of this change of colour.

In the state of health the gastro-intestinal mucous membrane varies in its thickness, according to the part of the tube examined. Billard has described it as most thick in the duodenum, and the thickness as diminishing in the following order of parts: the stomach, rectum, jejunum, ileum, and colon, where it is thinnest: it is obvious, however, that unless the increase or diminution of thickness be considerable, its value in a pathological view cannot be great; and, independent of intestinal disease, it may present appreciable differences. Thus, in cases of great emaciation, the atrophy of the membrane is often extreme, while in examples of mechanical congestion its thickness is frequently much increased. Louis has attempted to determine the exact depth of the mucous membrane by measurement; but this is a mode not applicable to general use. As to its consistence, this is stated to be in the direct ratio of the thickness; hence, if in those situations where the membrane has naturally the greatest thickness, we find its consistence only equal to the thinner portions, it is plain that from some cause this has been diminished. It is difficult to meet with cases on which to try the accuracy of this assertion. We have been led to doubt it more than once, but the

impediments to the investigation are very considerable; the greatest experience is required to enable us to decide on the healthy consistence of the part; and we seldom meet with the tube free from some active or passive congestion: add to this, that many other circumstances cause variations in the cohesion of the membrane, such as the presence of liquids in the tube, putrefaction, atmospheric heat, and a fluid state of the blood. The mucous follicles have lately attracted the particular attention of pathologists; and to their inflammation several remarkable disorganizations may be referred. Thus, in very many cases of intestinal ulceration, the destructive process seems to be primarily seated in these glands. Bretonneau has indeed described a peculiar disease, called by him *dothin-enteritis*, consisting in an inflammation of these glands alone; but it is still to be shown whether this disease in reality differs from other examples of intestinal inflammation. In these countries the writings of Drs. Hewett, Bright, and Abercrombie have contributed to draw the attention of physicians to these glands.

We find these bodies, in the state of health, most developed in the duodenum and stomach, and in some cases also the glands of Peyer are observed distinctly in the small intestine. This is more remarkable in children, but still their enlargement alone in the adult must not be considered as an unequivocal indication of former or actual disease.

Lastly, we have the sub-mucous and sub-serous cellular membranes, and the two orders of muscular fibres, in which tissues disease may produce a great increase or diminution of volume. The muscular fibres are compared by Andral to the muscles of white-blooded animals, and are found strongest at the pyloric portion of the stomach and in the rectum. This tunic of course appears thicker where the intestine is contracted, and, like the heart, may become atrophied in cases of general emaciation. We often indeed meet with cases where the demonstration of these fibres is a matter of great difficulty.

The natural condition of the intestine is a collapsed but pervious state. Dr. Abercrombie, in his theory of ileus, holds that the cord-like contraction is the normal condition of the part; but in this opinion he is completely singular: contraction of a muscle implies the communication of a stimulus, and cannot be considered as its natural state.

But the consideration of these tissues alone will throw little light on the physiology or pathology of the intestinal canal, if we do not take into account that its surface presents a prodigious vasculo-nervous expansion, where, in a manner analogous to the retina in the eye, or the portio mollis in the internal ear, the (sensitive) extremities of the organic nerves, and to a certain degree of those of the life of relation, are extended. It is, to use the words of Broussais, an internal sense, and thus can be understood its numerous sympathies in health and disease.

There is no organ in the body where the

determination of the value of morbid appearances is so difficult, and hence it is necessary to investigate a great number of circumstances before we can say whether the mucous membrane has or has not been in a state of disease. In general these difficulties are not sufficiently estimated; and it is to be regretted that one class of pathologists are too hasty in ascribing every change from the physiological condition to a process of irritation; in these countries, indeed, vascularity alone is too often taken for an unequivocal indication of the previous existence of inflammation, a circumstance which invalidates many of our accounts of morbid changes in the digestive system. We shall see that vascularity alone, in all its forms, does not prove the previous existence of inflammation; and that, further, the converse of the proposition will sometimes be found to be true. It may be laid down as a general principle that no morbid appearance whatsoever, taken singly, is a certain proof of the occurrence of inflammation. Even ulceration, perhaps the most certain of all, may occur under circumstances in which it is difficult, if not impossible, to trace it to an inflammatory origin.

The following are the results of inflammation on the intestine:—1. Increased vascularity, or hyperemia. 2. Increase or decrease of development. 3. Induration, or softening. 4. Ulceration. 5. Change of secretion in quality or quantity. 6. Alterations of sensibility.

Vascularity.—The great principle to be recognized in determining the value of this condition, as a proof of inflammation, is that there is nothing in its intrinsic characters sufficient to point out the nature of its origin. Many authors have described certain kinds of injection indicative of active or passive congestion; but the researches of Andral have shown that the distinctions relied on are by no means certain, and this also is the result of our experience. By a careful examination, however, of the concomitant circumstances, we shall, in most cases, be enabled to decide the question. Capillary injection, putting aside some of its rarer sources, may generally be stated to arise from one of the following causes:—1. active irritation; 2. congestion from abstraction of the venous circulation; 3. congestion from position. We may compare, by opposite characters, the inflammatory and non-inflammatory redness.

<i>Inflammatory redness.</i>	<i>Non-inflammatory redness.</i>
1. Occurring indifferently in the depending or non-depending portion of the tube.	1. Most distinct in the depending position.
2. General injection rare.	2. General injection common.
3. Without venous obstruction.	3. Commonly arising from obstructions in the porta, heart, or lungs.
4. Sometimes slight and local.	4. Generally occupying a large portion of the intestine.

<i>Inflammatory redness.</i>	<i>Non-inflammatory redness.</i>
5. With softening of the submucous cellular membrane.	5. Without much softening.
6. With alterations in the quality or quantity of mucus.	6. Without these alterations.

By means of this table, which, with some alterations, is taken from the work of Billard, we may in most cases determine the nature of vascularity occurring in the intestinal mucous membrane. The presence or absence of ulcerations, of fungoid elevations, of lymph, the state of the submucous follicles, the occurrence of thickening, and, lastly, the history of the case, will aid further in deciding the question. It has been remarked that the active and passive congestion differ in the circumstances of their formation; in the latter the injection proceeds from the large vessels, which are first distended to the capillaries, while in the former the reverse takes place. This may be a test in the earlier stages of the process.

From the consideration of the different causes of redness in this tissue, it would appear that before we conclude that vascularity in any case is an unequivocal sign of inflammation, we must in the first instance inquire whether it is not the result of the process of digestion; *secondly*, whether it may not be owing to a fluid state of the blood, as observed by Morgagni; *thirdly*, whether it arises from putrefaction, exposure to air, or the depending position; *fourthly*, whether it is the result of the congestion which occurs immediately before death in tissues abounding in vessels; *fifthly*, whether it is caused by obstructions in the aorta, heart, lungs, cava, or vena porta. Other causes of redness, independent of inflammation, are noticed, but they are not of great importance, except in the case of a patient dying in the cold stage of intermittent, where the viscera are found loaded with blood. These considerations show the difficulties that exist in the decision of this question, and should make us doubt the reports of inflammatory appearances in the digestive tube, unless made by the most experienced pathologist.

The shades of colour which are produced by a process of irritation are very numerous, but may be reduced to modifications of red, brown, slate-coloured, and black; of these, the first is most commonly, though by no means universally, the product of an acute inflammation, while the three last are nearly exclusively the result of a chronic process, in which the colouring matter of the blood, variously altered, becomes incorporated with the tissue of the mucous membrane. Of the red colour, Billard enumerates six varieties, viz. the ramiform and capillary injection, the punctuated and striated redness, that occurring in patches, and, lastly, the diffuse. Bearing in mind that all these may be the result of other causes besides irritation, and that we must look to the concomitant circumstances to decide upon their nature, we must admit, with the author just mentioned, that the first of these, consisting of a very

slight injection, must be the result of a feeble irritation, one to which the flux is by no means considerable. In the second species the injection is finer and closer, and points out a much higher degree of irritation. This is often seen in the neighbourhood of ulcerations. The punctuated redness is less common in the intestines than in the stomach; its appearance may be compared to that produced by finely sprinkling a surface with red paint, and it does not point out an intense degree of irritation. As to the striated redness, we have most usually found it in cases of chronic enteritis, where, for a considerable length of the tube, the prominent edges of the valvulæ conniventes were of a deep red colour, giving to the intestine the appearance of circular stripes. It sometimes coincides with a puriform secretion and an indurated state of the sub-mucous cellular tissue. The last two species are the most important; here the vascularity is intense, so much so as to obliterate the traces of the capillary vessels, and give to the membrane a continuous blood-red colour. They may both be the product of an acute or chronic inflammation, but generally arise from the first cause. The diffuse redness is sometimes found of great extent, and points out a most severe disease. We have often seen the mucous membrane, in such cases, exactly similar to the conjunctiva of the eye-lids in the worst forms of purulent ophthalmia. This appearance was found in most of that singular set of cases, greatly resembling the yellow fever of warm climates, which were observed at the Meath Hospital during the late epidemic of fever. It is the result of the highest degree of idiopathic inflammation; it is no longer an injection, but an active ecchymosis.

The brownish, slate-coloured, and black appearances of the mucous membrane are generally referred to a very chronic irritation. The last, indeed, is most commonly seen in cases of diarrhoea of long standing, and occurs with other indications of a profound morbid action. It is, however, seen in some cases of a high degree of acuity, as in instances of corrosive poisoning, and in the yellow fever and dysentery of tropical climates. This is important, as connected with the opinion of Broussais, where, in speaking of the black colour of mucous membranes, he holds that in most of these cases an acute had preceded the chronic state.

An important question here arises—do these appearances of inflammation always furnish an accurate measure of its intensity? We have seen that there are circumstances foreign to irritation that may increase this vascularity, such as position, mechanical impediments to the venous circulation, &c. Hence, in certain cases, the appearance of inflammation may point out a greater degree of disease than had really existed. But does the reverse ever occur? Can an inflammatory injection exist, and yet wholly or altogether disappear after death? Bichat and Broussais are both in favour of this opinion, and hold that, although no redness may be found in the part after death, yet, notwithstanding, it may have

been inflamed and vascular during life. This is a doctrine of importance from the dangerous use which may be made of it in pathology.

It is true that after death the traces of erysipelas will greatly, if not altogether, disappear in some cases, and the same has been observed with respect to the redness of a sore throat. Bichat explains this by stating that the injection of the capillaries ceases as soon as the irritation which caused it becomes extinct with the life of the patient, and lays great stress on this point in its application to morbid anatomy. But cadaveric pallor of parts previously inflamed, though occurring in some cases, is far from being a general phenomenon, and where the inflammation has been intense, as in severe cases of erysipelas or angina, the redness will remain long after death. Besides, it is scarcely logical to draw conclusions as to the viscera, from what occurs on the surface. We know that in most cases of death the blood appears to forsake the exterior, to accumulate in the interior of the body, and that this process goes on for some time previous to the extinction of life. If this post-mortem emptying of the capillaries went on in the mucous membranes as we see it in the skin, redness of these tissues should be as rare as that of the skin; but the contrary is the fact. We may admit the possibility of this subsidence of the appearances of inflammation of the mucous membrane in very slight cases; but looking at the phenomena of death in general, we must hold it more probable that these appearances will be augmented rather than diminished on the cessation of life.

But there is one cause for the want of redness even where a high degree of irritation has existed in parts, namely, the supervention of inflammation in other viscera, which, from its excess, causes an actual revulsion. Thus, when a bronchitis subsides on the supervention of a fatal diarrhoea, we may find the bronchial membrane free from vascularity; or *vice versa*. This cause is alluded to by Billard. In the severe gastro-catarrhal fever, we constantly observe alternations of severity in the abdominal and thoracic symptoms, and more than once we have seen cases in the early stages of which the symptoms of enteritis were severe, but subsiding when the thoracic irritation became intense, and have found the *intestinal membrane pale, although ulcerations and other disorganizations were present*.

With respect to the relative frequency of inflammatory redness in different parts of the digestive tube, it is agreed that the stomach and lower part of the ileum are most commonly engaged, and it is remarkable that the two affections often coincide. This has led to the term *gastro-enteritis*; a term, however, which cannot be adopted, as the coincidence is by no means universal, and as by a too great generalization, it leads to an erroneous view of the disease. The order of frequency, as given by Andral, in the remaining portion of the intestine, is as follows:—the cæcum, colon, rectum, duodenum, superior portion of the ileum, and, lastly, the jejunum.

Increase of development, or hypertrophy of the coats of the intestine, is generally the result of a process of chronic irritation; the thickening of the mucous membrane which occurs in acute affections being more apparent than real, and owing to vascular turgescence merely, while that in the chronic cases is a true hypertrophy, the result of an increase of nutrition. The parts which, in acute diseases, are most usually increased in bulk, are the mucous membrane, and the glands of Peyer and Brunner, while all the constituents of the tube may become hypertrophied in the chronic enteritis. The thickness of the sub-mucous cellular tissue is rarely altered in acute, but commonly in chronic cases.

When the mucous membrane is hypertrophied, we find the change to be circumscribed, or the contrary, and seldom observe the tissue equally thickened. In the large intestine we have commonly found the mucous membrane elevated into numerous nodules, of about the size of a pea, between which ulcerations, or a lesser degree of hypertrophy, existed. Numerous varieties of these elevations are described by authors. In cases of this hypertrophy the consistence is generally increased, and the colour dark; and it rarely happens that the change is confined to the mucous membrane alone; it occurs much more frequently in the large than the small intestine.

But of the forms of hypertrophy of the intestinal tunics, that of the sub-mucous cellular tissue is the most important. In this state we find it a dense white layer, sometimes more than two or three lines in thickness, presenting a distinct fibrous structure, and giving to the whole tube a remarkable feeling of thickness and rigidity. The induration is often so great as to cause a grating sound when the intestine is divided by the scissors. The principal seat of this alteration is the sub-mucous, but we have often seen it to engage also the sub-serous cellular membrane. It is in the large intestine that the change is most usually observed, where, after chronic dysenteries, it is found in conjunction with other disorganizations. In the small intestines, however, it may be met with, generally partial, and in the vicinity of old ulcerations; but in a few cases of severe chronic enteritis we have found hypertrophy of the whole cellular membrane from the pylorus to the anus. These were cases where severe symptoms had continued for months, the patients presenting that singular tenacity of life observable in greatly emaciated subjects.

To this change is to be referred most of the cases of organic stricture of the intestine: indeed, when examined anatomically, we can see in this disorganization nothing but a partial hypertrophy of this tissue, generally traceable to a process of inflammation in the mucous membrane. We say generally traceable, for although in the present state of the science we must attribute most of these cases to this cause, yet in some it may arise from a morbid process, not originating in or extending to this tissue. These, however, may be looked on as exceptions to a general rule, and, as far as we

have seen, seem connected with a disposition to cancerous degeneration of the cellular membrane, both in the solid and hollow tube.

This alteration, as a result of chronic enteritis, may be met with in all ages, from the infant to the octogenarian. It is, however, stated to be most common between the ages of thirty-five and sixty-five, and that between puberty and the first of these periods it rarely occurs. We have already alluded to the atrophy of the intestinal tube, a change which may be confined to the mucous membrane alone, or engage all the coats of the intestine. How far atrophy can be referred to a process of inflammation does not yet appear to be determined, as there is a difficulty in the circumstances of the general nutrition being impaired in these cases. We have seen ulcerations coinciding with an atrophy of the intestine, but in all these cases great emaciation had existed some time previous to death. This atrophy appears always to coincide with a softened state of the mucous membrane.

Change of consistence is always admitted as one of the consequences of inflammation, and, with a few exceptions, the rule, that a chronic irritation tends to harden, while an acute tends to soften parts, is generally found to be true. In the gastro-intestinal mucous membrane the latter part of this proposition is, in our experience, always true; but we cannot make this statement with respect to the first part, the fact being that an indurated or softened state may result from a chronic enteritis, though the first effect is the most usual. We have found the indurated state of the mucous membrane under the two following circumstances: first, in cases of chronic dysentery, where the mucous membrane of the colon was hypertrophied and ulcerated; between the ulcerations the consistence of the membrane was greatly increased: secondly, we have seen, in cases of scirrhus degeneration of the subjacent cellular tissue, the mucous membrane of the small intestine singularly changed; it resisted traction remarkably, had lost the velvety feel, and gave to the touch precisely the sensation that is presented by the vagina in cases of advanced cancer of the uterus. The parts most indurated appeared to be the projecting edges of the valvulae conniventes, and the whole of the membrane was studded with extremely minute and hard granulations.

We now come to the consideration of the inflammatory ulcerations of the intestine. When we compare the bronchial and intestinal mucous membranes in their pathological states, we must be struck with the difference in the frequency of ulcerations in these tissues. In the first, they are of rare occurrence, in the latter extremely common; in the first we constantly see an acute or chronic inflammation without a trace of ulceration, in the latter this effect constantly results from both these forms of disease. This difference may be explained by considering the great predominance of the mucous crypts in the gastro-intestinal system, as compared with the respiratory. In fact, for the healthy performance of the re-

spiratory function, a very small quantity of mucous secretion is required, but the reverse is the case as to the function of digestion. We must also take into account the greater exposure of the digestive canal to chemical and mechanical stimulation.

The circumscribed ulcerations of the intestine may be divided into two classes, those affecting the mucous membrane alone, and those engaging both this tissue and the mucous glands. The first of these species is the rarest; the second is extremely frequent, and is called the follicular ulceration.

As the minute description of these ulcerations is not of much practical importance, we shall not enter into the subject here, and shall merely refer to the late works on pathological anatomy, and to the article *FEVER*, for complete information. Suffice it to say, that they are extremely frequent, and that their varieties, with respect to number, appearance, and accompanying disorganizations, are infinite. The cases in which they are most frequently met with are the following:—typhous fever, with predominance of gastric symptoms; dysentery; long-continued diarrhoea; stricture of the intestine; infantile remittent; tabes mesenterica; tuberculous phthisis, and in cases of hypercatharsis, from an over-dose of purgative medicine.

In the great majority of cases these ulcerations do not perforate all the coats of the intestine, but in a few this does occur, and the result is most commonly an effusion of the contents of the intestine into the peritoneal cavity, and consequent rapid peritonitis. Two important facts seem ascertained with respect to these perforating ulcers, *first*, that they are almost always the result of disease in the mucous follicles, and, *secondly*, that they are more liable to occur from acute and circumscribed than from chronic and extensive disease. We may explain this by considering, that in the chronic ulcerations the cellular membrane at the base of the ulcer is generally more or less indurated and hypertrophied, which gives it an increased power of resistance to the ulcerative process, and also that from the general emaciation which commonly occurs in such cases, the tube is in a state of anæmia, where, of course, inflammatory action will occur with a lesser degree of activity. The extent of the disease, by diminishing its intensity in any particular point, may also contribute to this result.

The situation of the perforating ulcer is remarkably similar in most of these cases. In the ten examples recorded by Louis it occurred somewhere in the last twelve inches of the ileum, and out of the same number observed by us in the Meath Hospital, but one instance occurred where it was in a different situation, namely, the cæcum. This ulcer was also remarkable in not presenting the follicular character. We may remark, that these observations as to the situation of the perforating ulcer apply principally to the acute cases.

Effusion of the contents of the intestine is not a necessary result of this lesion, as the serous covering of the adjacent fold of intes-

tine may form adhesions round the edges of the ulcer, and thus constitute its base, or a direct communication may be formed between two portions of the tube previously in contact. In both these cases the occurrence of general peritonitis is not a necessary consequence. (See the article *PERITONITIS*.)

Treatment.—We shall first examine the treatment of the disease as it occurs in the *infant and child*. In most instances of this affection we may admit of two stages, indicating a different treatment; the first, where the antiphlogistic method is to be our chief resource; the second, where revulsives and the cautious use of the tonic plan are indicated.

In this affection it is not often necessary to have recourse to the lancet, although such a case may arise, as where the symptoms are violent, the fever high, and the constitution healthy and robust: here venesection cautiously performed will generally be followed by the best results, and be the best preparative for other measures. In these countries a prejudice against bleeding in the child sometimes exists, but we believe that it is unfounded. More than once have we seen the symptoms continuing with violence, and even resisting the employment of leeches, until blood was taken from the arm; then the remedies which had before failed acted well, and recovery was progressive and ultimately complete. When we cannot succeed in opening a vein in the young infant, the mode from which most advantage is derived, is the application of a leech or two to the back of the hand or foot, and afterwards plunging the part into warm water; in this way we can obtain a considerable quantity of blood, and the hemorrhage is easily controlled by a bandage.

If the bowels should not be open, it is advisable to procure a moderate evacuation of the tube, but no violent or irritating purgative is on any account to be given, and we should trust chiefly to the mildest laxatives and to injections, which are almost always productive of the best effects. It sometimes happens, after the above means have been employed, that the disease appears either to be subdued or greatly lessened in its intensity; the tongue cleans and the fever is much diminished; but in more violent cases this alteration is scarcely perceptible, and then no time is to be lost in applying leeches to the belly. This may be done at all ages, and is without exception our most powerful remedy in most cases. The number must be proportioned to the violence of the disease and habit of the patient. We have seen three or four leeches applied to the abdomen of an infant of twelve months old with the best effects; but, as a general rule, a leech for every six months of the child's age up to that of four years would not be excessive. These may be re-applied according to circumstances, for it often happens that symptoms, scarcely if at all affected by the first application, will subside on the second. The prejudice against the use of leeches in the diseases of children is fast wearing away; in fact, the only objection

of weight is the difficulty of arresting the hemorrhage. For this purpose the simplest and most efficacious mode is the application of the solid nitrate of silver to the leech-bite. A stick of caustic should be cut down to an extremely fine point, and being pressed to the bottom of the wound, (which should be previously dried by a little lint,) and given a turn or two, is then to be withdrawn: this seldom fails to stop the bleeding at once.

The internal remedies from which we have seen most advantage are the combination of a mild mercurial with Dover's powder, and, in the next place, gummy solutions. The hydrargyrum cum creta, with Dover's powder, may be given in repeated doses, proportioned to the age of the patient. An over-degree of narcotism is, of course, to be avoided; but it frequently happens that, after a decided opiate effect has been produced, the symptoms of intestinal irritation greatly subside. It is a remedy that requires caution in its exhibition, but one of great utility. It sometimes constipates, and when this occurs it may be omitted, and a small quantity of castor oil or manna may be given, assisted by an emollient injection; and when these have performed their office, the remedy can again be resumed.

In some cases it may be desirable to produce a decided mercurial action. To excite this in the child is a matter of great difficulty, and our own experience leads us greatly to prefer the external application of mercurial ointment to the administration of much calomel. We have known a mercurial plaster, or dressing a blistered surface with the ointment, answer remarkably well. But in every case we should endeavour to remove the disease without the exhibition of a great deal of mercury, as its effects in children of an unhealthy habit are often most formidable.

Blisters have been used in this disease with various results, and if they are not employed until the advanced stages of the affection, and are employed only as secondary to general or local bleeding, they will often be useful. In young children they should never be left on for more than two or three hours, and in older patients they should be removed as soon as uneasy sensations are perceived from them. It is always advisable to insert a piece of silver-paper between the blister and skin. As a general rule, it may be stated that blisters should not be used when the skin is very hot, the fever high, and the patient in a state that would admit of general or local bleeding. Perhaps they may be more safe in those cases where the mucous inflammation has arisen from the suppression of a cutaneous irritation.

There is a difference of opinion about the utility of the warm-bath. We have found it chiefly useful in the advanced stages, and where there is much diarrhoea; but it appears to us that the practice of diligently fomenting the belly is as serviceable, and one which may be used in all stages.

The little patient must be kept on an extremely strict regimen, and every thing that could possibly disagree must be avoided.

A strict regimen is peculiarly necessary in the enteritis of children, as the slightest irregularity in this respect may produce a fatal relapse. Cold water may be freely allowed and may be slightly acidulated, according to the feelings of the patient; in addition to which we have always been in the habit of administering in some quantity a solution of gum arabic, and have seen, in cases where the disease predominated in the lower portion of the tube, the most decided benefit from it. But after the first week of the disease it becomes necessary to attend to the support of the patient. Many children are lost by the practitioner neglecting this point. Small quantities of the farinaceous foods, milk and water, and very weak chicken-broth may be used, and their quantity regulated by the effect on the symptoms. These should be given at stated intervals of time, say every third hour; and it may even be necessary in the advanced stages to administer a little wine, particularly when the skin is cool, the countenance sunk, the mouth covered with sordes, and the stools involuntary. Should this excite a too strong re-action, it can be omitted, and again resorted to if necessary. Great attention must be paid throughout to prevent excoriation of the back, and to preserve the warmth of the extremities, and the apartment should be kept at a regulated temperature. This, among its other advantages, will tend to prevent the liability to bronchitis, which disease sometimes carries off the patient after the subsidence of the enteritis.

Enteritis in children is commonly mistaken for worms, and thus improperly treated. Drastic purgatives are lavished; the increase of symptoms and the marasmus are attributed to the persistence of the worms; until at length typhoid symptoms appear, or the child falls into the state of *tabes mesenterica*. These cases are always of the worst description from obvious reasons. It would appear that when the disease arises from the use of indigestible food, or from constipation, purgatives cautiously exhibited at the outset are useful; but if after the unloading of the bowels the symptoms continue, it is a sign that something more than mere irritation from the presence of noxious substances exists, and that we must treat the disease as one of enteritis. These remarks apply equally to the enteritis of the child and adult. The indiscriminate system of purging in all cases is the opprobrium of British medicine, for it is a fact that, since the writings of Hamilton and Abernethy, too many practitioners have had, in the treatment of digestive derangements of most kinds, but two objects in view, the one, of giving doses of purgative medicine, the other, the quantity and quality of the fecal discharges; while the gastro-intestinal surface, that prodigious vasculo-nervous expansion, has been wholly unheeded and forgotten.

Cerebral symptoms often supervene in the course of this affection, and it is sometimes difficult to say whether they proceed from actual disease of the brain, or merely indicate a sympathetic excitement not amounting to

positive inflammation. But we know that sympathetic irritation cannot long exist in so delicate an organ as the brain without producing disease, and further, that we cannot tell when this change takes place. Hence the safe mode of proceeding is always to treat the cerebral symptoms as if they really proceeded from encephalitis. In such a case it is generally unnecessary to use the same degree of vigour in treatment as if the disease was idiopathic inflammation.

When the disease occurs in *the adult*, the chief remedy will be found to consist in the detraction of blood generally and locally, but particularly the latter, unless in cases where the symptoms run high and threaten peritoneal inflammation. Here the lancet is never to be neglected, and its use must be repeated frequently if the violence of the disease is not subdued. Dr. Abercrombie recommends the practice of following up the first bleeding by smaller detractions of blood, so as to keep up a decided impression on the system. It seems, however, that in most cases we may look on general more as a preparative for local bleeding, which, when properly performed, is a means of extraordinary value. Facts, however, oblige us to admit the efficacy of general bleeding alone in reducing inflammations of the mucous membrane.* When the disease exists in the small intestine, we have always found most advantage from local bleeding. It may be performed at various stages of the disease, even when there is great adynamia, and will seldom disappoint the practitioner. Leeches should be applied abundantly round the navel or to the ileo-cæcal region, and the hip-bath used when they fall off. If the symptoms do not yield at once to this treatment, the leeching is to be boldly repeated, and a large poultice applied over the belly. The bowels are to be gently opened by the mildest laxatives, and emollient injections should be frequently given.

The most distressing symptoms in this disease are the vomiting, thirst, tympanitis, and diarrhoea. It is often very difficult to allay the first of these. We have found nothing so efficacious as the application of a dozen leeches to the epigastrium, and the liberal use of iced water, or even plain ice, which may be given nearly ad libitum. It is a most grateful and important remedy, and one from which we have never seen any unpleasant results. In the more advanced stages of the disease we have constantly applied leeches to the epigastrium, though in smaller number, and have seen that assemblage of phenomena which constitute the typhoid state speedily disappear after their use. In addition to this, we have in the hospital often applied a small blister over the region of the stomach, and afterwards sprinkled the surface with a little acetate of morphia, a practice which, in some cases, succeeded remarkably. Effervescent draughts, with the carbonate of soda or ammonia, may be exhibited, but not in too great quantity, as

violent diarrhoea and exasperation of all the symptoms may be the result of this excess. Lastly, opiates, and, in some very advanced and low cases, stimulants may be used with advantage. The thirst may be moderated by the use of cold acidulated drinks, such as lemonade, the cream of tartar solution, and tamarind-tea; but let it never be forgotten that the means best calculated to remove these symptoms are those calculated to reduce the inflammatory action. The tympanitis, when it arises, is a symptom commonly maltreated from ignorance of its pathology. Occurring in the early stages of the disease, it is generally in proportion to the intensity of the inflammation. It is a distressing symptom, and hence practitioners are over-anxious for its removal, and are tempted to exhibit turpentine. From witnessing a great number of cases where this practice has been pursued, we feel certain that the exhibition of turpentine or analogous remedies for the removal of tympanitis in the early stage is a practice pregnant with danger. It often, indeed, renders the belly flat; but this apparent advantage is commonly followed by an increase of the other symptoms; and the tympanitis is sure to return. If the symptom be not severe, its presence should not make us modify our treatment; if it is excessive, it becomes a sign for increased activity in means calculated to reduce the inflammation without endangering the safety of the patient. In addition to this, stimulating injections, where there is not tenesmus, may be used, and enemata of cold water in all cases. In the stages of the disease, however, where depletion can no longer be practised, the use of turpentine is sometimes successful, a circumstance reconcileable with our knowledge of the effects of stimuli in the advanced periods of mucous inflammation.

Nearly the same remarks apply to the diarrhoea. The exhibition of astringents in the early stages is generally followed by the worst effects, a circumstance favouring the doctrine that the secretion is the relief of the inflammation; but when the powers of life are low, and the disease not acute, we must moderate it. This is best done by the warm-bath, a flannel roller, the occasional application of a blister to the belly, anodyne injections, and the use of small doses of Dover's powders, with or without rhubarb. Where the diarrhoea was severe and the patient much depressed, we have often used large doses of opium with the best effect.

The remarks as to revulsion, regimen, &c. which we made in treating of the enteritis of children, apply equally in this form of the disease.

(W. Stokes.)

EPHELIS (from $\varepsilon\phi\eta\iota$ and $\sigma\lambda\iota\sigma$, *sol*), a genus of diseases of the skin, of the order *macule*, (see the article *MACULE*.) characterized by discolorations, varying from dark brown to greyish yellow, and presenting great diversity of form, from small distinct points, sometimes scattered, sometimes grouped, to large confluent or continuous patches.

* See Cheyne's Report on Dysentery.

Syn. Maculæ fusæ (*Plenck*); Ephelides (*Alibert*).

We use the term *ephelis* in the extensive sense which has been given to it by *Gorræus*—"non quod à sole tantum vitia illa in cute contrahuntur, sed quod à reliquis inducta causis, similem asperitatem et colorem habeant;"* although we do not altogether agree with *Bateman*,† that this acceptance of the term is sanctioned by the authority of *Hippocrates*,‡ for he appears to have distinguished between *lenticula* (*φαιδς*) and *ephelis*, both included in this definition. *Celsus* went farther; he not only distinguished between *lenticula* and *ephelis*, but also between *lenticula* and the *φαιδς* of the Greeks.§ These distinctions were lost sight of, and the term *ephelis* was made more comprehensive by *Oribasius*,|| *Ætius*,¶ and *Actuarius*.** *Sennertus*†† revived the ancient distinctions, in which course he was followed, more or less, by *Sauvages*, *Lorry*, and *Plenck*; but whilst the first of these raised distinctions on one hand, he removed them on the other, and thus included under *ephelis* morbid appearances which have no relation to it. This last is also the error of *Alibert*, who, in his order of *Ephelides*, includes scorbutic blotches.

These affections of the skin seldom demand or deserve, on their own account, the attention of the practical physician; but as signs of internal disorders they sometimes afford very valuable diagnostic evidence, as much as *erysipelas*, *urticaria*, *prurigo*, and many other eruptions. And we perfectly agree with *Alibert*, that they afford matter of interesting research to the physiologist, shewing how the integuments may become discoloured, and revealing in some manner, by external appearance, the alterations to which the human body is subject. Besides, it is shewn in the study of the natural sciences that the most trifling facts may be useful, because, being connected by an almost imperceptible chain with phenomena much more important, they sometimes indicate, sometimes explain them.

The process of the formation of the *ephelis* is unknown. It is not the result of any particular alteration of the epidermis, but some modification of the pigmentum of the skin which science is not yet able to explain. It would seem sometimes to be a consequence of an inflammatory action; it is frequently accompanied with signs of a determination of blood to the skin, but neither of them are constantly observed. It is very variable in its progress and duration, sometimes developing itself fully and extensively in the course of a night, sometimes very slowly; sometimes it is permanent, continuing indelible

for several years, and sometimes it disappears after a single bath or lotion.

Not having found any previous arrangement of this genus which satisfactorily comprehends all its varieties, we propose considering it under two species, viz. 1. *Ephelis lentigo*; 2. *Ephelis diffusa*.

1. *Ephelis lentigo*. *Syn.* *φαιδς* (*Hipp. et Græc.*); *Lenticula vellentigo* (*Latin.*); *Ephelis lentigo* (*Sauvages and Alibert*); *Lentigo* (*Lorry, Plenck*); *Lentigo ephelis* (*Frank*); *Sommersprossen et Sonnensprossen, Sommerflecken* (*Teutonicæ*). Freckles.

An eruption of small minute spots of a fawn, yellow, or brown colour, sometimes disseminated, sometimes in clusters, unaccompanied with any pain or itching.

This eruption presents itself under two circumstances; it is either hereditary, a natural deformity of the skin, or it is purely accidental, the result of exposure to the sun's rays. This affords the division of the species into two varieties: a. *Ephelis lentigo materna*. b. *Ephelis lentigo æstiva*.

a. *Ephelis lentigo materna*. *Tâches de rousseur* (*Gallicæ*). The well known lenticular eruption, forming, as it were, part of the natural complexion of yellowish or reddish-haired persons, who are, besides, distinguished by the strong odour exhaled by the secretions of their skin. (*Alibert*, Pl. xxvi.) It is more rarely, but sometimes, observed in persons of a fair and delicate skin with dark hair and eyes. The colour and shade of the eruption bear always a near relation to the colour and shade of the hair, being sometimes as dark as coffee or chocolate, and sometimes of a light yellow. The eruption is not confined to the parts of the body exposed to the light and air, but sometimes occupies the whole surface; neither does it disappear in winter. It is to this variety that the French term, "*tâches de rousseur*," strictly applies.

They who would attempt to cure this deformity would deserve a severer rebuke than that of *Celsus*—*Penè ineptia sunt, curare varos, et lenticulas, et ephelidas*. But the importance attached by the fair sex to this discoloration has not left the matter unattempted—*eripi tamen feminis cura cultus sui non potest*. It would be idle to repeat the various means which have been used for this purpose. They who are curious in such matters may consult *Ætius*, lib. 1. serm. 4. cap. ii.; lib. 4. cap. xiii.; *Haly Abbas*, lib. 9; *Avicenna*, Fen. 7. tr. 2; or the monograph of *Bender* on *Cosmetics*.*

b. *Ephelis lentigo æstiva*.—*Syn.* *Ephelis*: *Maculæ solares* (*Plenck*); *Ephelis a sole* (*Sauvages*); *Nigredo a sole* (*Sennert*); *lentigo æstiva* (*Jos. Frank*); *Le hâle* (*Gallicæ*). Sun-burn.

To this variety exclusively belongs that very common lenticular eruption, chiefly observed in young females of a delicate complexion, supervening with the summer and disappearing

* *Defin. Med. ad voc. ἐφελίς.*

† *Synopsis*, p. 442.

‡ *Prædict.* lib. 2. xxxi. 9; *de alimento*, iv. 18; *de sterilibus* vi. 8; *de morb. mulier.* lib. 2, lxvii. 6, lxviii. 1.

§ *De Medicinâ*, lib. vi. cap. 5.

|| *De loc. affect. cur.* lib. iv. cap. 52; *Synops.* viii. 33.

¶ *Tetr. ii. serm.* iv. cap. 11.

** *Meth. Med.* iv. cap. 13.

†† *De cutis vitii*, lib. v. pars 3.

* *Phil. Ludov. Bender de Cosmet. Argent. 1764.*

with the winter, and confined to those parts of the body exposed to the sun and air.

This eruption is purely a local affection; the radiation of the sun upon the exposed surface of the skin, more particularly observed in youth, being the only cause of this eruption; hence those occupied in the labours of the field, mountaineers, those accustomed to expose themselves bareheaded, or persons pent up and etiolated in cities, when they visit the country, are particularly subject to it. This cause may operate quickly or slowly, and the colour of the freckle always bears some relation to the complexion and colour of the hair.

When this eruption does not cease with the removal of its cause, or with seclusion, or the use of veils or shadowing hats, its disappearance may be accelerated by the use of certain local applications; and, indeed, even under the influence of its cause, it may be much moderated by them. Every country supplies some of these nostrums, chiefly domestic, the results of vulgar experience. They are most of them more or less stimulating, but some of them soothing and demulcent. The best practice is for the bland and emollient application to precede that of the stimulating. The former consists of such things as vapour (that of milk was an especial favourite); emulsion of the seeds of cucumbers or melons, or pomatum prepared from those seeds; decoction of the flour of lupines, of tares; the boiled pulp of the roots of narcissus; paste of bitter almonds, and such like. The latter consisted of poultices made of the seeds of cauliflower, or of the flour of tares or lupines macerated in vinegar, or the bulbs of the narcissus boiled in vinegar, to which was added some of the roots of the wild cucumber, bryony, and the leaf-stalks of the fig-tree; the juice of the house-leek, the leaves of the cherry-tree, the leaves of ivy, the ashes of the sepia, the bulb of the Illyrian iris, and the bulbs of the lilly, mixed with nitre and honey. Ox-gall has been always celebrated. The favourite remedy in the harem of Turkey is said to be a pomatum prepared from balsam of Mecca, the seeds of the garden cucumber and cerussa: in the north of Europe, Goulard's lotion, the juice of sorrel, lac sulphuris macerated in the juice of currants, solution of sulphates of zinc or copper, lemon juice, oxycrate with camphorated mixtures, rubbing the part with a slice of lemon or of a sour apple. But all these various means may be more conveniently represented by any weak alkaline solution,

(R. Liqueur. potassæ, 3i.

Aq. rosar. ʒii. fiat lotio.)

or a diluted spirit or acid lotion.

The following were favorite formulæ much vaunted:

R. Ol. amygdal. amar. ʒi.

Tartar. per deliquium, ʒʒ.

Ol. rhod. gtt. ii. M.

R. Sapon. venet. ʒii. solve in

succ. limonis, ʒi. adde ol.

amygdal. amar. Tartar. per

deliquium, aa. ʒʒ.

Ol. rhodan. gtt. vi. M. fiat pomatum part. illin.

2. *Ephelis diffusa*, an eruption of distinct or confluent large, irregular, round patches, of a tawny, yellow, or brown colour.

This form of ephelis may be symptomatic as well as idiopathic.

a. *Ephelis diffusa symptomatica*.—*Syn.* Maculæ hepaticæ (*Sennert**); Hepatizon (*Var. Auct.*); vitiligo hepatica (*Sauvages*); kelis fulvescens (*Swediaur*); Ephelis (*Plenck*); Chloasma (*P. and J. Frank*); Ephelis hepatica (*Alibert*); chaleur du foye, tâches hépatiques (*Gallicæ*); Leberflecke (*Teutonice*).

This eruption, which is generally preceded by a slight itching, is of the colour of saffron or rhubarb, sometimes pale like the withered leaf; it is most commonly situated on the neck, sometimes entirely surrounding it like a cravat; on the abdomen, especially on the region of the liver, over the kidneys, or on the groins; sometimes on the forehead. The patches are at first distinct and distant, but extending gradually they run into each other, or they form groups more or less numerous. (Plate LXXIX. *Bate-man's Delineations*; Plate XXVII. *Alibert*.) They are sometimes slightly elevated, and terminated by a desquamation of fine thin yellow scales assuming somewhat of the nature of pityriasis, the *pityriasis versicolor* of Willan, the *chloasma pseudo-porrigo* of Frank; and sometimes they are complicated and coincident with the wheals of *urticaria*. The itching is sometimes much greater than that of pityriasis; it is much influenced by the weather, and increased by being heated by exercise. *Alibert* has observed that the patches of ephelis are not transpirable, but very dry, whilst the surrounding skin is soft and moist.

This variety of ephelis is sometimes permanent and sometimes transient. In the first state it is met with chiefly in men of close sedentary habits, presenting large blotches upon the abdomen, sometimes entirely encompassing it as a belt, or large patches over the shoulder. Some of these spots it is not difficult to disperse, but some remain indelible. In the second state they are more frequently observed in women in the form of isolated circular patches, appearing and disappearing very rapidly, sometimes in the course of half a day; they are chiefly seated on the back part of the neck, on the throat, breast, and hypochondria. In some women they return at every menstrual period; in others they co-exist with suppression of the catamenia, the *chloasma amenorrhæum* of Frank; they afford sometimes a sign of conception,† appearing as superficial spots as broad as the hand, of a pale yellow or dark tawny colour, without roughness or inequality, most frequently on the forehead, breasts, and abdomen, occasionally disappearing at the end of the first month, but frequently continuing during the whole period of

* Lib. 3, pars iii. sect. 1. cap. viii.

† *Hippoc.* de morbis mulier. *Sennert.* Pract. lib. 5, pars iii. s. 1. c. 2.

gestation, and not always disappearing on parturition—the *ephelis gravidarum* of Plenck and Sauvages, the *chloasma gravidarum* of Frank. It is remarked that those who are most indisposed by pregnancy are most liable to this eruption. In men they are observed sometimes precursive of a hemorrhoidal flux. In women, the itching attendant upon them is always increased on the approach of the menstrual period. Sauvages says he has not unfrequently observed the eruption of ephelis to be periodical after tertian and quartan agues, and sometimes an attendant of *nostalgia*.

Besides the state of body just mentioned as predisposing to this variety of ephelis, it is frequently accompanied by a serious disorder of the function of the liver, but most constantly connected with chronic irritation of the stomach and intestines. In such cases it is sometimes suddenly excited by any trifling vexation, chagrin, or contrariety, or by protracted application or study.

The treatment of this eruption consists in the appropriate cure of the primary disorder of which it may be a symptom: when connected with the natural functions of the body, it can only be remedied by promoting their more easy performance; when symptomatic of uterine disorder, it demands the treatment of amenorrhœa or dysmenorrhœa, when of chylopoietic disorder, its cure falls under dyspepsia. In general, mild cooling cathartics, light diet, sulphurous preparations, particularly the sulphurous mineral waters, as those of Harrogate, Cauterets, &c., and if necessary, a mild alterative of some mercurial and antimonial preparation, constitute the internal remedies. The best external preparations are sulphurous baths, particularly of the natural warm mineral waters, the warm sea-bath, or locally a lotion of sulphuret of potass.

R Potass sulphuret. ʒi.

Aquæ lib. ii. fiat lotio.

Camphorated vinegar is also a good local application. When the spots are indolent, friction, and, if not extensive, a sinapism applied for a short time, or a poultice of soft soap, have been known to succeed.

b. *Ephelis diffusa idiopathica*.

We only notice this variety that we may not omit two forms of ephelis enumerated by other writers.

1. *Ephelis ignealis* (Sauvages); ephelis spuria (P. Frank); lentigo ab igne (J. Frank); taches de brûlure (Gallie). The mottled spots produced by artificial light and heat, observed on the legs and arms of those who bask over the fire, or on the legs and thighs of women who during winter make use of the chauffepié.

2. *Nigredo a sole* (Sennert); fuscado cutis (Plenck); ephelis umbrosa (J. Frank); die braune haut (Teutonic). The dark, swarthy, brown colour of the skin acquired by Europeans who inhabit tropical climates, or by those exposed to salt-water and hard weather.

(T. J. Todd.)

EPIDEMICS. Epidemic diseases (*νόσοι ἐπιδήμοι*, from *ἐπί*, among, and *δῆμος*, people,) are those which attack a number of persons, in any city, district, or country, about the same time or season. They are generally uncertain in their recurrence. When they produce great mortality they are called pestilential. Epidemic diseases are chiefly of the acute or febrile class, some of which are apt to prevail in spring, some in summer, and some in autumn; some in one country, and some in another.

Endemic diseases are found to prevail more or less at all times, in districts where the local causes act, and among people exposed to their operation: but the production of epidemics, inasmuch as they depend on circumstances of a wider range, which are in their nature variable, (such as the vicissitudes of heat and cold, the prevalence of particular winds, the varieties of season and weather, as to drought and moisture, the deficiency or deteriorated quality of different articles of common food, and other things,) is liable to great uncertainty in almost every part of the world.

As epidemic diseases are above defined, they do not exclude some that are contagious. Distinctions have been attempted to be established, it would appear unwisely, between epidemic and contagious diseases. An attentive and unbiassed observation of facts removes these unphilosophical distinctions. Many epidemic diseases appear, under certain circumstances, to be communicable by contagion; and some diseases, avowedly contagious, prevail epidemically. Facts, in all ages, would seem to show that most epidemic diseases have a tendency to spread by intercourse with those exposed to the same causes of disease, and thus predisposed to it. This tendency has been made too much of by systematic writers, in some cases; and in other cases, too little. No epidemic disease either attacks simultaneously, or rages with indiscriminate violence, among all classes, in any community; and no contagious disease attacks every one who is fully exposed to its influence. Epidemic diseases, whether contagious or not, have their assigned laws. Even when highly pestilential and destructive, they observe stated seasons, and periods of rise, increase, and decline. When their attack is most sudden and general, they pass over a large proportion of the community. In the former case the disease loses its malignity; in the latter, some constitutions are proof against the common destroyer, without any apparent immediate intervention of art.

It is a rare thing that any one form of epidemic disease rages alone, that is, without being preceded or followed by another. Different forms of epidemic diseases usually succeed each other in a series, either in the same year or in different years: and this is called an epidemic constitution. Sydenham was of all English physicians the chief observer of these phenomena, and was pre-eminently entitled to the appellation of the English Hippocrates: he was of too honest a nature to let preconceived opinions and mere arbitrary names of diseases

prejudice his correct observation of their changes from one season to another.

Viewed practically, epidemic diseases require minute and cautious observation on the part of the physician; for diseases of the same name, as Sydenham remarked, often require different treatment at the beginning of the epidemic and at the decline; as they require different treatment in different countries, and frequently in the same, under different epidemic constitutions. The diseases of an epidemic constitution will sometimes shew an unusual tendency to one part of the system, and sometimes to another; as they will affect a particular type. This tendency is either to the skin, or the head, or the chest, or the stomach and bowels, and often continues for many months, or even years, in the reigning diseases. It was remarked that at the time the sweating sickness raged in England, other diseases assumed the sweating tendency.

It is much to be lamented that many things stand in the way of accurate knowledge on this subject. It is comprehensive, and surrounded with difficulties, in proportion to the extent and variety of the observations which are requisite for forming scientific conclusions. If medical observers had been contented to look with simplicity into the series of events belonging to epidemic diseases, like Hippocrates and Sydenham, we should not have been so much in the dark at the present day. Facts apparently contradictory, at least as to the proper name and the contagious quality of certain epidemic diseases, such as the Levant plague, the Asiatic cholera, and the yellow fever, have been brought forward by men justly eminent in their profession, but wedded to particular opinions. Hence has arisen the extreme difficulty of knowing the truth. Physicians, on the very site of pestilence, have sometimes, like children at play, taken opposite sides, and maintained their ground with unseemly pertinacity; so that we may look in vain to either party for unprejudiced observations. The records of all modern visitations of pestilential epidemics present us with opinions and statements as much at variance as light and darkness; and hence we must conclude either that one set of observers are right and the other wrong, or both partially informed but blinded by prejudice, so that they cannot see any truth in their antagonists' assertions; consequently, that many things which they report as facts are only partial observations, or vague rumours, or hastily formed conjectures, or unconnected and adventitious appearances. Truth is sacred, and error cannot be propagated without some injury. How incumbent, then, is the duty of medical observers to inquire impartially and to report with fidelity! He that presents us with a physical observation clouded by his prejudices, on a subject so deeply important to the health and welfare of his fellow-creatures, is but a degree less culpable than the man who gives a false colouring to some moral or religious truth, which involves the dearest interests of humanity.

If this view be correct, where shall we look for the facts—strictly such—which may assist our reasonings on this weighty subject? It is not, clearly, to recorded observations of infection and of non-infection, adduced by contagionists and their opponents, that we must refer for those unexceptionable data on which some safe practical conclusions may be built. We may perhaps admit something from each, but must reasonably doubt their wholesale inferences.

The subject would be involved in a cloud of darkness which no diligent and honest inquiry could penetrate, if there were not other things besides facts of infection and non-infection—in short, other facts connected with the origin, spread, and decline of pestilential epidemics, (for to these we shall chiefly confine our attention in the present article)—which, though too much overlooked, throw a good deal of light upon the whole question, and not only point to something quite independent of their contagious and non-contagious nature, but help us to determine how much importance we should attach to these circumstances in the general estimate. It is fortunate for our science that there is such a class of facts, and that the lover of truth has not to range in a wilderness of uncertainty. It is also a source of gratification that many of these facts are admitted by both parties, or at least, with few exceptions, are not denied by either.

Now, the facts of a comprehensive nature above alluded to, which belong to pestilential epidemics, may be classed under the following heads; on each of which it is proposed to make a few general observations, with a view of drawing some conclusions from the whole.

1. The natural signs which are either the antecedent indications or the concomitants of a pestilential epidemic, such as intemperate seasons and unusual weather, deficient or unwholesome food, mortality among any species of the lower animals, uncommon abundance of some of the insect and reptile tribes, depopulation of birds, &c.

2. The singular changes which have been observed to occur in the common or reigning diseases of the place, before, during, and after an epidemic pestilence.

3. The changes in the symptoms, or type and character of the epidemic pestilence itself, and the circumstances attending its migrations from one place to another.

4. The facts relating to the connexion of epidemic pestilence with offensive cities, marshy grounds, and low filthy situations, bad food, and a condensed, filthy, and ill-fed population, in all countries; and, on the other hand, the exemption of those places where due attention has been given to cleanliness, wholesome and sufficient food, and a rational system of health police.

5. The facts given in evidence from quarantine establishments and lazarettos.

Before we proceed further, it is proper to explain what is meant by an epidemic pestilence: the term is used generically to include

several species. It denotes a destructive or fatal disease, which appears at uncertain periods or intervals, but at seasons of the year peculiar to different epidemics and to different countries, in large assemblages of human beings, already predisposed to receive it: it attacks its victims in succession with various degrees of violence, leaving however many untouched, during the course of a few weeks or months, in a particular place or city, and then declines by degrees, as it began, but with diminished force, either moving onwards to other places which it invades in the same manner, or entirely disappearing for the time.

The plague of Egypt and the Levant, the bilious fever of Spain, and the yellow fever of America, the cholera of India, and the low malignant fever of our own country, are different forms of pestilence, observed sometimes to prevail epidemically in their respective countries; for different countries seem to have their particular forms of epidemic pestilence, to which they are more liable than to others, and which, in common experience at least, do not invade each country indiscriminately. When individual cases of any of these forms of disease occur at unusual seasons, or at times when there is no tendency in the disease to spread; in other words, when there appears to be no predisposition in the population of any city or town to receive it, the disease is said to be sporadic or local: such cases may appear at any time in the country which gives birth to the disease. If such sporadic or local cases should by any chance appear in other countries, by whatever means occasioned or introduced, a multitude of facts seem to demonstrate that there is no danger of their spreading, at least to any alarming extent.

1. It is stated by Dr. Mead in his learned Treatise on the Plague* that a "corrupted state of air attends all plagues." Dr. Mead was an enlightened physician, and though his work was written professedly to establish the contagious nature of the disease, yet his researches into the histories of the various visitations of pestilence in different countries compelled him to admit that "a corrupted state of air is, without doubt, necessary to give the contagious atoms their full force." Dr. Russell, who practised at Aleppo during the plague of 1760-1-2, admits in its fullest extent the dogma of Mead, but expresses the fact in other terms, more philosophically perhaps; and denominates that state of air which is alone favourable to the propagation of disease, a *pestilential constitution of the air*; without which, he states, "it is incontestible that the plague will not become epidemical." It must not be forgotten that Dr. Russell was a warm advocate for the foreign origin of pestilential contagion; and that he maintained no combination of indigenous circumstances could give rise to the plague in Syria. Sydenham, also, who witnessed the rise of the plague in London in 1665, found it necessary to take a "pestilential

constitution of the air" for granted.* Here, then, is an ultimate fact, so far as the testimony of such eminent physicians can establish it—a principle on which to found an argument as clearly laid down as any other in natural history. We might not be disposed to contend either for the propriety of the terms used by Mead, or for the absolute correctness of those employed by Sydenham and Russell; but for a state of air, present or just past, and perhaps also of the body, indispensable to the epidemic rage of pestilential fever.

It is a fact too well known to be questioned, that plagues and pestilential fevers, whether the bilious yellow fever or malignant typhus, have often been preceded and accompanied by irregular and intemperate seasons; in other words, by great extremes in the weather. If we examine the histories of the plagues of London in 1625 and 1665, of the Netherlands in 1635-6, of Aleppo in 1740 and 1761, of Marseilles in 1720, and of Malta in 1813; if we turn our eyes to the modern visitations of pestilence in Spain and the United States, and the East Indies; or if we look back to the descriptions of the plagues of Athens and Rome, as recorded by Thucydides and Livy, without laying any stress on the poetical colouring of Homer, Lucretius, and Ovid, we find that some remarkable intemperature of the weather and seasons has been the antecedent, and, generally, a warm southerly constitution of the air a concomitant of these events. This intemperature, whether marked by excessive cold followed by excessive heat, or excessive rains followed by excessive drought, and *vice versa*, has so often concurred with fatal epidemical distempers to form one series of events, that we have the pestilential constitution, or *κατάστασις λοιμωδής* of the observing ancients, especially the Greek physicians, as clearly laid down as any aphorism in our science, and prognostics of pestilence framed accordingly. A volume might easily be filled with facts illustrative of this position; but we must premise one general remark, that, straitened as we are, by the nature of the work, within narrow limits, yet in so comprehensive an argument some general results must necessarily be assumed; pledging ourselves at the same time for the truth of the principle, whilst we are omitting the details on which it is founded.

There can be little difficulty in tracing a connection between intemperature of the seasons and famine or unwholesome food; and the relation of the latter to the production of epidemic pestilence is more clearly manifest when we consider that its violence almost invariably falls upon the poor. It is a remark of Dr. Mead, deduced from his previous enquiries, and confirmed by every pestilential epidemic subsequent to his time, "that it has never been known when the plague did not first begin among the poor." This observation is strengthened by the histories of the yellow fever in America and in the south of Spain, of the cho-

* Chap. i.

* Chap. ii. sect. ii.

lera in the east, and of our own epidemic fever, particularly in Ireland. The poor are the chief victims, because they are principally subjected to the exciting causes.*

Mortality among some tribes of the lower animals not unfrequently follows intemperance of the seasons. Sometimes this mortality is noticed among dogs, cats, horses, and mules; and sometimes among sheep and cattle used as the food of man. In the pestilence that raged at New Orleans in 1819, we are told that the cattle died:—"horses, oxen, and cows with rotten tongues; sheep and hogs with their hoofs dropping off, and calves with rotten ears." Dr. Hodges bears a very striking testimony to this fact in his *Loimologia*, or Account of the Plague in London in 1665:—"Many knowing persons," he observes, "ascribed the pestilence to the quantity of bad meat from the preceding sickness among the cattle, which was sold so cheap to the poor that they fed upon it even to gluttony." "It is incredible to think how it raged among them—to such a degree that it was called the *poor's plague*."

The question does not seem to have been entertained, whether the same physical causes which acted upon the cattle might not have acted also on that part of the human species which was most exposed to elemental vicissitudes.

Salvaresa supposes the epidemic fever of 1764, at Cadiz, was occasioned by the old and corrupted corn. "Amongst the poor," he says, "the disorder was most violent. In this year the animals were first affected; and the mortality was principally observed among birds that fed on grain, as pigeons, poultry, &c."†

In the fever of Cadiz of the year 1800, Sir James Fellowes asserts that "the air, from its stagnant state became so vitiated, that its noxious qualities affected even animals; canary-birds died with blood issuing from their bills; and in all the neighbouring towns which were afterwards infected, no sparrow ever appeared."‡

Dr. Mead states that "it has been observed in times of the plague that the country has been forsaken by the birds." This curious fact does not belong only to the form of pestilential fever called plague: it is one of the many phenomena which are scarcely reconcilable with the notion that gives to the causes of pestilence so confined a range as the intercourse with an infected individual or the exposure to fomites. Livy tells us that in the pestilence at Rome, A. U. C. 571, "not a vulture was to be seen for two years;" and Thucydides relates that in the plague of Athens "the birds that usually preyed on human flesh entirely disappeared." Diemerbroeck, the learned and candid author of the work on the plague of Nimeguen in 1636, records that "it often happened, when canary-birds died without any obvious cause in any house, the plague shewed itself

not long after in some of the family." He also states that birds were much more scarce than at other times:—"avium multo rarior numerus." It is mentioned by Dr. Short that "during the four months Dantzick was afflicted, in 1709, all kinds of birds, as swallows, crows, sparrows, &c. deserted the city."

"A *rubigo* or mildew, i. e. a dew impregnated with highly corrosive powers,* was anciently deemed one of the causes of epidemic diseases. The Romans, apprised of the pernicious effects of these mildews, instituted what they denominated *festa rubigalia*, and worshipped an imaginary God under the name of Robigo. Hoffmann mentions such a dew, 'ros valde corrosivus,' as having infested vegetables in 1693-4, whence the cattle died in multitudes.† And Ramazzini ascribes an epidemic to similar dews; at which time the vegetables, corn, and fruit became black, being affected with a 'lues rubigalis.' The same year was remarkable for the scarcity of honey; and most creatures that live upon what they extract from vegetables died or languished. Probably such occurrences led many of the ancient writers to mention the silence of the grasshopper, and the drooping inactivity of the bee and the silk-worm, among the presages of impending pestilence. As to the spots, which are said to have assumed various forms, especially those of *crucicula* or little crosses, and to have appeared suddenly on garments, utensils, &c. as they are recorded chiefly on the authority of monks, whose writings are highly tinged with superstition, they are scarcely worthy of serious consideration."‡

Most of the writers who treat of the prognostics of pestilence refer to swarms of some of the insect tribes. Lord Bacon particularly remarks that "those years have been noted for pestilential, wherein there were great numbers of frogs, flies, locusts, &c." The plagues of Dantzic, Nimeguen, and Marseilles, and many others, afford illustrations this fact. To give details of all the natural signs would not be compatible with our object.

2. To found a truth in science we must have recourse to general observations. Isolated facts are only valuable so far as they tend to establish general laws. There is no science in which what are called facts require to be viewed with more suspicion than in that of medicine; nor any department of it where there is more room for error than in that which comprehends the invisible region of contagious miasms and atmospheric impurities. We have the following general observation of Dr. Mead in relation to the matter before us: "Fevers of extraordinary malignity are the usual forerunners of plague, and the natural consequence of that ill state of air which attends all plagues." This admission cannot but be considered very important. It does not, however, depend upon the authority of Dr. Mead. The fact is confirmed by a most ample induction. Fevers of extraordinary ma-

* Heberden, On the Increase and Decrease of Disease, &c.

† Dr. Maclean.

‡ Dr. Good, vol. ii. p. 74.

* See Hird on Pestilence, p. 91.

† Tom. i. de Temp. Ann. Insalub.

‡ Rees' Cyclop. art. Epidemic.

lignity, and other forms of mortal disease, have been observed to be the usual forerunners of plague or epidemic pestilence in almost every country.*

It was rather triumphantly stated that the plague of Malta in 1813 formed an exception to this rule, in order to prove the position that the disease was imported from Alexandria; in fact, that no precursor fever ushered in that pestilence: and if we had no other accounts of it than those by Faulkner and Tully, we should have been left somewhat in the dark on this point. But the candid and enlightened Dr. Hennen informs us that "for four or five years preceding that in which the plague raged, sudden deaths were more frequent than ordinary, and during the twelve months immediately preceding, and especially for the last month of the period, the increase was still more remarkable, inasmuch as greatly to excite public observation."† "Apoplexies (or sudden deaths) and other diseases were never so general or so numerous in the memory of man."

"It is observable," says Dr. Heberden,‡ "that at its first breaking out the disease has never been known to be the plague. It has moreover very generally been preceded by a severe putrid fever." The plagues of Venice in 1576, of London in 1625 and 1665, of Nimeguen in 1636, of Naples in 1656, of Marseilles in 1720, of Aleppo in 1742 and 1760-3, of Holstein in 1764, and of Moscow in 1771, were all preceded by malignant fevers.

Now if any one should enquire what are the effects of that peculiar state of air which ushers in an epidemic pestilence, the answer attested by long experience is, the occurrence of malignant fever. This is one part of the history of such events. But let us notice more particularly the observation which Dr. Heberden has annexed to the statement of this fact, viz.: that "at its first breaking out, the disease has never been known to be the plague." The simple reason of this extraordinary circumstance, and of the doubts and dissensions which have sprung from it, is the gradual and imperceptible change of the malignant fever into the true pestilential fever or plague, and the contrariety of this fact to the medical systems and authorities which have assigned different forms of the same disease to different classes and orders in nosology. We may almost take shame to ourselves that we belong to a profession which, either from the imperfection of the science itself, or from the deficient observation of its followers, has exhibited so many instances within the last two centuries in different countries, of reproachful contention among the faculty, on the eve of pestilence, about its name and nature; and which hitherto has laid down so few solid data to secure practitioners from future quarrels on the same ground. Leaving

the disputes about contagion out of the question, the disputes about names or nosological terms have agitated physicians in Italy and France, and Russia and Germany, and Spain and America, not excepting our own country, till the sober and impartial members of the profession are mortified, and legislatures are wearied and disgusted; for the latter know not what is really matter of fact, and the former are unwilling to ally themselves with such fierce combatants. Lord Bacon's aphorism, in its general signification, has been repeatedly confirmed since his time, that "the lesser infections of small-pox, purple fever, agues, &c. in the preceding summer, and hovering all winter, do portend a great pestilence the summer following; for putrefaction rises not to its height at once." Lord Bacon was too much of a philosopher to intercept the regular series of natural phenomena by his own fancies, and too little of a systematic writer on medicine to perplex himself with the trammels of artificial distinctions imposed by names. But some physicians have endeavoured to show that there was only a casual connexion between the pestilential epidemic and the malignant fever, its forerunner; and numbers have on such occasions involved themselves in keen disputes, whether the name of malignant fever or that of plague was the proper appellation of the epidemic pestilence itself. In this way they have too generally trod the thorny ground of contention instead of the simple path of faithful observation; and the consequence is, that we have more of counter-statements than of unquestionable facts reported to us from the scene of every pestilential visitation.

Nevertheless, all is not confusion; and there are some things on which medical science may repose with satisfaction in reference to this part of the subject. Two important observations belong to it: the one is, that the malignant fever which precedes the plague, commonly reappears at its decline; and the other, that during the continuance of the epidemic pestilence itself, at least during its active prevalence, all other forms of epidemic disease, such as those which are peculiar to the place and to the season of the year, are entirely extinguished. With regard to the former, it may be noticed, that one of the first and most evident signs of the epidemic pestilence being about to cease its ravages, is the appearance of another form of epidemic fever, generally of that which preceded, and sometimes of a new train of diseases; this new order of things indicating that the pestilential constitution is changed, or, at least, the disposition in the air to foster and spread the principal disease, completely for the time removed. The second fact is interesting, both from the antiquity of the observation and from its accordance with modern experience; that, while the tyrant disease is prevailing, it usurps complete dominion, and suffers no other disease to appear of an epidemic character. This was noticed in the plague of Athens by Thucydides; and every pestilence since that memorable period has verified the observation. It was noticed particularly in the last plague

* See *Webster's History of Epidemic Diseases; and Researches into the Laws of Pestilence*, by Thomas Hancock, M.D.

† *Edinburgh Medical and Physical Journal*, No. 104.

‡ See his observations above quoted: p. 85.

of Malta. A fact recorded by Sauvages* places this circumstance in a very strong light, viz. that when the plague was raging in the south of France in 1720-21, no greater number of persons died of the disease in the town of Alet—and none died of any other disease—during the year of its visitation, than used to be carried off by other diseases, though the plague absorbed all others, or in fact put them to flight while it was prevailing. This is an incontestible fact, and a sufficient answer to those who deny the operation of any general cause. For it is perfectly clear that if a vessel from Sidon brought the plague to Marseilles in 1720, as was alleged, and that the contagion was conveyed from thence to Alet in Languedoc in 1721, as was asserted, this accidental circumstance, upon that hypothesis, must have exerted a most extraordinary influence on the atmosphere of the town of Alet, or rather on the constitution of every one in it, if it put every other form of mortal disease to flight for a whole year after.

The general remarks above made, relative to the forerunners of plague and its insidious approaches and dominion over other diseases, apply also to the pestilential fever of Spain, and to the yellow fever of America. "The occurrences," says Dr. Halloran, "which preceded the epidemic of Barcelona in 1821, correspond with the old and recent observations on a similar subject in other countries; it almost invariably happening that the yellow fever of Spain is preceded by unusual diseases of various form and force, more particularly by bilious remittent fevers, which are often so aggravated and malignant that physicians themselves do not venture to define the line of demarcation between them and the avowed epidemic." In the "Sketches of the Medical Topography of the Mediterranean," by Dr. Hennen, who closed his professional career at Gibraltar in 1828, and who observed and wrote with equal candour and ability, we find it stated that, "in 1813 bad remittent fevers preceded the epidemic which raged at Gibraltar, and that its true nature was disguised, till it had made such progress as to be prevalent in every quarter of the town."

With regard to the transatlantic pestilence, Webster informs us that "the yellow fever never occurs in the temperate latitudes of America, except under a pestilential constitution of the air, manifested by other malignant diseases; and that it has been preceded by acute diseases, and followed by remittents, dysentery, and malignant pleurisy."

3. We believe that the remark of Sydenham applies to the plague, and the yellow fever, and the Indian cholera, and to every other form of epidemic pestilence; that "all epidemics at their first appearance seem to be of a more spirituous and subtile nature, in other words, more violent and acute, as far as can be judged from their symptoms, than when they become older."

These changes or varieties in an epidemic

pestilence, during a few months' career, might be considered at some length under three heads, viz. the proportional mortality, the appearance of the symptoms, and the alleged difference in the contagious properties; but a very brief notice of each must suffice.

As to the first, it appears to be a universal fact, that at the first rise of an epidemic pestilence, the proportional mortality is always greatest; and, on the contrary, at the decline, whether a few months or weeks only comprise the whole career, the disease loses much of its fatal character; putting entirely out of view the interference of medical art in either case. Knowing this to be the law, though we might not be surprised that, at the appearance of a new and formidable disease, when all is perplexity and alarm, medical men should be at a loss respecting the proper treatment, and should often witness the unequal conflict of their science; yet we can scarcely withhold a smile, when we see so much self-congratulation, and the numerous cases of recovery at the decline attributed to some improved plan of treatment.

With regard to the symptoms or outward character of an epidemic pestilence, we believe the assertion may be safely warranted, that it has never happened that the appearances were uniform in its beginning, height, and decline. As to the plague, this is well known to be the case: Sydenham, Russell, and others, note the fact. On the points of distinction between the varieties of the disorder we need not dwell; though it would be a work of no small practical utility to consider the usual periods in which the bubo, carbuncle, purple spots, and milder features of the disease make their appearance. But if our limits allowed, it might be shewn that even the quick or apoplectic nature of the attacks at the commencement, bears a near affinity to some of those precursor diseases, which, in London, Marseilles, Aleppo, and Malta, ushered in the pestilence itself; and at the decline the mild features and diminished mortality exhibit a striking contrast with its previous violence and malignity. It would scarcely be right to conclude this part of the subject without noticing an observation of Sir James M'Grigor, shewing the varieties which the same disease will sometimes assume under the influence of different localities and seasons. "When the plague first broke out in the Indian army in Egypt, the cases sent from the crowded hospitals of the sixty-first and eighty-eighth regiments, were from the commencement attended with the typhoid or low symptoms. Those which were sent from the Bengal battalion, when the army was encamped near the marsh of El-Hammed, were all of the intermittent and remittent type. The cases which occurred in the cold rainy months of December and January had much of the inflammatory diathesis; and in the end of the season, at Cairo, Ghiza, Boulac, and on crossing the isthmus of Suez, the disease wore the form of a mild continued fever."

With regard to the appearances of the yellow fever in Philadelphia in 1793, Dr. Rush tells

* Nosol. Method. vol. i. p. 415.

us, that "the frequent absence of a yellow colour led to mistakes which cost the city several hundred lives;" as the want of inguinal tumours at the rise of the plague of Messina in 1743, caused thirty-three physicians out of thirty-four to deny the pestilential nature of the disorder, and to neglect the proper means of checking it, till it was too late.

It might appear that we were departing from the rule at first laid down, and entering upon disputable ground by taking any notice of contagion; but the observations to be made being formed by decided advocates of that doctrine, they ought at least to merit due attention from all who do not deny it, especially from those who ascribe so much more to contagion than to atmospheric influence. Dr. Russell informs us that at the beginning of an epidemic plague the contagion is so feeble, in other words, so many of the attendants escape infection, and such long intervals occur between the cases, as to cause serious perplexity respecting the nature of the disorder;* and that the contagious property is nearly, if not quite extinguished, at the decline, both in persons and clothes, must be obvious to every unbiassed observer who considers the facts; for the disease has never ceased in any place for want of subjects to act upon.† And the comprehensive remark of Dr. Russell is a striking answer to those who can trace the extinction of an epidemic plague to no other means than police regulations. It is in these words: "From what has been said of London, Aleppo, and Marseilles, it would seem as if there was little observable difference in the mode of its termination, in cities where purification was practiced and where it was not."

In all stages of the bilious pestilence of America its contagious property is so indistinctly marked, that Dr. Rush felt himself obliged to confess that "the interests of humanity were deeply concerned in the admission of the *rare and feeble* contagion of the yellow fever." And although contagion is what popular opinion fixes upon the plague as its necessary attribute, yet there cannot be a shadow of doubt, that at all times this contagious property of the disease depends on so many contingencies to give it force, as to justify the remark of Dr. Russell, "that the dread of contagion from plague may, consistently with truth, be moderated."

Dr. Russell sums up the matter in these words, after stating that "the constitution of the air is the cause which heightens or lessens the susceptibility of the contagion."—"1st. In the beginning of a pestilence the disease, though less contagious, appears in its most fatal form. 2d. On its increase and height, though manifestly more infectious, the malignity of the effluvia does not seem to be exacerbated, because milder forms of the disease are then more common. 3d. Several persons infected from the same subject are variously afflicted; some in a greater, some in a lesser

degree, the disease being modified by difference in constitution. And, lastly, persons in constant communication with the sick, who have resisted infection in the most contagious stages of a pestilence, are sometimes attacked in its declining state; which seems to indicate some change in the habit of the individual, not the increased activity of the contagious effluvia."*

"At Aleppo there were instances of persons who had exposed themselves two or three successive seasons, being attacked at length when the contagion was fast on the decline, and the distemper had become in all respects milder."†

In considering the progress of an epidemic pestilence from one country or city to another, it must be viewed as a remarkable fact, that a disease which has become so mild as to lose the power of doing mischief in one place, when transferred to another should begin in the same insidious and destructive manner, and continue to rage with the same violence, and at last moderate its fury in the same way as it was observed to do in the former; making due allowance for the variety of circumstances which must tend to modify the effects in different places. On the common exemption of strangers and others we have not time or space to enlarge.

4. The evidence which bears upon the connexion of pestilence with filth, &c. is remarkable: it is both negative and positive. The negative is the absence of pestilence from those cities of Europe, now for more than a century and a half, which have adopted a system of health-police, not by guarding against foreign contagion, but by domestic cleanliness. The positive is the devastation of those where attention has not been paid to these points; and the immediate good effects which have resulted from sanatory regulations wherever they have been adopted. "Dr. Heberden," as was observed by Bateman in an able article on the subject, "has collected the most ample and satisfactory evidence of the connexion of plague and of the malignant contagious fever, which usually precedes and accompanies it, (if, indeed, they be not modifications of one and the same disease,) with the filth of crowded, ill-constructed large cities, in all ages and countries." London, Paris, and the cities of the Netherlands, which were formerly scourged by pestilence, whenever untoward causes operated, such as wars, uncultivated fields, famine, or unwholesome food, wretchedness occurring in a congregated mass of human beings, added to irregular seasons and intemperature of the climate, have been comparatively exempt from its visitations since their streets were paved and widened, and kept clean from animal and vegetable filth, which formerly lay in heaps under a scorching sun; since sewers have been dug, and fresh water has been abundantly supplied to them; since houses have been better ventilated, and built more for the purposes of health than of harbouring the greatest mass of people in the smallest possible space; and

* Russell on the Plague, pp. 19 and 261.

† Researches, p. 156.

* Treatise on the Plague, p. 261.

† Ibid. p. 301.

since all kinds of stagnant pools have been removed from their vicinity. And, besides the exemption from pestilence, the type and character of the reigning diseases in some of these cities have been much changed for the better; and the relative mortality has been wonderfully diminished. This is strikingly exemplified in London.

But as it was always in the most filthy parts of those cities that plague "originated and maintained its head-quarters," so, in other cities, which have been tardy in adopting such improvements, as Marseilles, Moscow, and other places, there was a corresponding liability to its invasion much later than the period above noticed. And now, if we turn our attention to the domestic sources of malignant fever still subsisting in the cities of Spain, which have so often been scourged with it of late years; or to the present state of Constantinople, Cairo, and Alexandria, we need not wonder at the facts which experience has thus unfolded to us from time to time in confirmation of these principles. "All the towns and cities (in Spain) which suffered from the yellow fever were, with the exception of Cadiz, filthy in the extreme, disgustingly so, and very objectionable on the score of ventilation, situation, and form of construction: while the different towns of Arens, Matero, Badalona, Tarragona, Vimaros, Benicarla, Valencia, Alcama, Velez, Malaga, Maraballa, Estepona, Vejer, Conil, Puerto Real, Rota Chipiona, Orcos, and Medina Sidonia, all of which are in the vicinity of the sea, and which, it may be presumed, from their relative situations, communicate freely with the theatres of disease, were not affected by the malady. They seldom, indeed, suffered in any other years; because, independent of their localities being better chosen for health, they are comparatively clean."*

In the cities of the east which are still scourged with the plague, they nourish from year to year the seeds of the disorder in their own bosoms, in climates, too, the most favourable to the propagation of pestilential epidemics; yet in these very places it is only in seasons when aggravated causes have been operating, that pestilence in an epidemic form appears; and when it does shew itself, the phenomena of its beginning, and height, and decline, correspond with those which have been stated to occur in other places, allowing for the difference of climate. Sir John Webb notes the common epidemic, or rather endemic, prevalence of plague in Egypt in these words: and the reader is requested to bear in mind the difference in the violence and symptoms of the disease in its beginning and decline. "The course of the disease is nearly the same every year, and equally varies in different seasons of the year. In Egypt it commences in November, at which time it rages with its most deadly malignity; and those who are affected by it sink into the grave almost without complaint. It continues its ravages with little abatement through the winter and the earlier

part of the spring, when, as the weather becomes warmer by the approach of summer, its attacks are less frequent, its symptoms much milder, and it subsides into a manageable malady." Pappou, a late French writer, tells us, that even in Egypt, when it was formerly well cultivated, the climate was healthy compared with that of Rome in its decline.

With regard to the indigenous causes adequate to the production of yellow fever or the transatlantic plague, which Dr. Rush had frequently an opportunity of observing, he states, "Philadelphia must admit the unwelcome truth sooner or later, that the yellow fever is engendered in her own bowels; or she must renounce her character for knowledge and policy, and perhaps with it her existence as a commercial city."

Although extensive marshes give rise to diseases of a febrile character every year among those residing in their vicinity, yet it is often found that, in seasons of uncommon intemperature, the malignity and fatality of such diseases are much increased. And this cause, concurring with other circumstances, has frequently produced a destructive pestilence.

Diodorus attributes a pestilential disease which occurred among the Carthaginians at the siege of Syracuse to the following combination of circumstances:—"the multitude of people confined within a narrow compass, the situation of the camp in a low and wet ground, and the scorching heats in the middle of the day, succeeded by cold and damp air from the marshes in the night." Fracastorius ascribes a malignant epidemic fever in Italy, in the sixteenth century, to an extraordinary inundation of the Po, which, happening in the spring, left marshes, and those corrupting infected the air through the summer. Forestus remarks that from the putrefaction of the water only, the city of Delft, where he practised, was scarcely ten years free from the plague or some pestilential distemper.* "At this day, says Assalini, the lakes, the marshes, and the filthiness which one finds in the cities of Lower Egypt, are the principal causes of the frequent diseases to which they are subject, and which can never be eradicated until we have found means to purify the atmosphere of their environs. This important advantage may be obtained by draining off the water of the lakes, and filling them up; by keeping the cities clean, paving them, and giving a free exit to the rain water, which stagnating in different parts of these cities, becomes corrupted, and, conjoined with filth, infects the atmosphere. By similar operations several cities and provinces in Europe, America, and the Indies, have been rendered healthy. The inhabitants of the citadel of Cairo, which is favourably situated on an eminence, during the plague of 1791 were exempt from the disease, which laid waste the lower town; with which, nevertheless, they continued to hold constant intercourse."

Bombay has been rendered much more healthy than it was formerly, by a wall built to

* Good's Study of Medicine, vol. ii. p. 81.

* Rees' Cyclop. Art. Epid. Dis.

shut out the sea, which formed a salt marsh, and by an order that none of the natives should manure their cocoa-nut trees with putrid fish.* According to Diogenes Laertius, Empedocles, the Sicilian philosopher, removed pestilential diseases from the Salenuntians, by conveying two streams of running water into the stagnating river round their city which gave rise to them.† Modena was subject to malignant fevers from a like cause; and by filling up the ditches and morasses which surround the citadel, these fevers have almost disappeared.‡

5. It is a singular illustration of the preceding views, that in none of the quarantine establishments on the continent, and in none of the stations appointed for the purpose in the British islands, along so great an extent of coast, engaged in such universal commerce, and for such a number of years, has there ever been an instance of a person suffering death in the process of expurgation or purification of goods imported from countries afflicted with pestilence. Evidence to this effect, so far as it relates to our own shores, was laid before a select committee of the House of Commons in 1819.§

Professor Assalini, who has given us some interesting particulars concerning the plague of Egypt, communicates the result of his inquiries respecting the matter in question in these words. "It has often been said, that in breaking open a letter, or in opening a bale of cotton containing the germ of the plague, men have been struck down and killed by the pestilential vapour. I have never been able to meet with a single eye-witness of this fact, notwithstanding the inquiries which I have made in the lazaretto of Marseilles, of Toulon, of Genoa, Spezia, Leghorn, Malta, and in the Levant. All agree in repeating that they have heard of such an occurrence, but that they have never seen it happen. Citizen Martin, captain of the lazaretto at Marseilles, who for thirty years has held that situation, told me that during that time he had seen opened and emptied some millions of bales of cotton, silk, furs, feathers, and other goods coming from several places where the plague raged, without having ever seen a single accident of the kind." The chief physician of the lazaretto at Malta informed Dr. Maclean that during the period of fifteen years in which he frequented the lazaretto, no cargo arrived, the expurgation of which infected a single individual in the establishment; and according to the testimony of the deputy-inspector Grieves, none of the persons so employed were affected in that island during the plague of 1813.

If we go to the Levant, we have the evidence of Sir James Porter, that "all sorts of merchandise susceptible of infection pass through the hands of our English factors at Aleppo, Smyrna, or the places from whence they are

shipped; they are examined strictly by them or by their servants; and there is not upon record, nor has a single living witness ever related an instance of an English factor or servant's dying of the plague, at any of the sea-port towns, or in any other part of Syria or Asia Minor, and but one only in Constantinople, in almost a century; though the disease very frequently rages in that metropolis."**

In connecting together the preceding classes of facts and observations, it is necessary to premise that a mere sketch is only given, and very general conclusions only can be drawn; but we believe that no theory of epidemic diseases will be perfect which does not include a comprehensive survey of all these circumstances.

As to the phenomena of the weather and seasons, it must be allowed that the physical signs deduced from their intemperature and irregularities, such as blights, mildew, abundance of insects and reptiles, flight and death of birds, murrain among cattle, and pestilence among brutes, are uncertain in their development in different countries, and even in the same; and that some pestilential visitations have occurred without any very striking signs of this sort having been noticed. But though this may have been the case, it does not appear that extremes of some sort have ever been wanting in the air and seasons as accessories to the cause. The uncertainty, however, in regard to the outward visible signs of atmospheric impurity, as recognized in the *manifest* qualities of the air, has induced some philosophers to suppose that there were *latent* qualities which neither our senses nor chemical knowledge could detect, implicated in the causes of the mischief. Some, accordingly, have given reins to their fancy, if they have not also given occasion to the advocates of contagion to confirm their exclusive opinions, in seeking for the cause of epidemic pestilence in mineral exhalations from the bowels of the earth, emitted by volcanos, earthquakes, and such-like convulsions. But though we may have some persons admitting a corruption of the air by mineral vapours, and others a contagious seminum as being necessary to the effect; yet a corrupt air which cannot be detected, and a contagious principle which must be hunted for in a variety of channels, and is constantly eluding the search, may still leave the truth in as much obscurity as it was before. We are therefore compelled to leave such unsubstantial hypotheses, for they only remove the difficulty a step. The notion of Sydenham, however, "that epidemic diseases arise from mineral vapours from the inmost bowels of the earth," comes somewhat nearer the truth, if we connect it with the effluvia and the effects of local filth and of animal and vegetable impurities in large ill-constructed cities and marshy situations. In situations of this sort vapours do indeed, at times, rise from the earth, (if not mineral impregnations,) which are known to be highly destructive. Yet, on the other hand, if local causes like these are existing year after year, and a general pesti-

* Lind on Hot Climates, p. 207.

† Diemerbroeck de Peste.

‡ See Assalini, p. 208.

§ Researches into the Laws of Pestilence, by T. Hancock, M.D. p. 233.

* Russell on the Plague, p. 309.

lence is but rare, how are these to be considered the cause? It cannot be doubted that local filth alone will not explain the circumstance. Like atmospheric intemperature it may contribute something, but it is not the cause. If, however, we add to the effects of unseasonable weather and of corrupting animal and vegetable materials, those of deficient or unwholesome food, and congregate the poor victims together in close sordid dwellings; surrounded and contaminated by local filth, then we fill up the range of predisposing causes which prepare the debilitated bodies of the wretched poor for the sudden invasion of acute disease, and lay them prostrate before the sweep of pestilence. But of famine, or unwholesome food alone, it may of truth be predicated, as of other individual causes, that it will not produce a pestilence. So that neither irregular seasons and bad weather alone, nor the effluvia from putrifying animal and vegetable substances alone, nor vitiated bodily secretions, however concentrated, alone, nor even diseased human secretions, the product of fever, however aggravated, alone, whatever marvellous stories may be attached by different authors to any of these particular circumstances, will ever be likely to produce a general pestilence. This opinion is hazarded, not without being duly weighed, after a careful enquiry into the specific effects of these several causes, viz.: atmospheric vicissitudes; animal and vegetable putrefaction; malaria, whether from marshes or the mouths of great rivers, or cities or camps; famine or bad food; and the concentrated poison of human filth and human disease. Yet the writer of this article is not the less assured that all these causes together have a powerful combined influence in occasioning that predisposition of body without which no epidemic plague will make any progress; without which no contagion will spread; and which, if in some few cases it require the assistance of a contagious principle to produce the disease in time of pestilence, yet in the majority of instances appears to surrender the multitude a prey to the common enemy without the medium of contagious intercourse. Nor is it, on the other hand, to be doubted that fear, wretchedness, fatigue, and excess, with other debilitating powers, both in an epidemic season and at other times, may co-operate with some of the predisposing causes above mentioned; and, perhaps, with contagion, to produce the disease even in the bodies of those who, living in the comforts of life, have been subjected neither to the undermining effects of bad food, nor to the corrupting influence of a vitiated air and local filth. It is probable that a predisposition is formed, occasionally, to take the disease in this way; but that it is very rare, and never has been the cause of general pestilence.

As far as facts therefore enable us to form any general conclusions in regard to the circumstances which conspire to produce a pestilence, the following appear to be legitimate deductions, without having recourse to the obscure notion of a pestilential constitution of the air, except in so far as we may apprehend it as an

ultimate fact. For it is in vain to inquire into the subordinate reasons, why an epidemic pestilence, in obedience to the laws of this constitution of the air, either observes certain seasons of the year, or a limited number of weeks or months to run its course, or a progressive movement in families and neighbourhoods, and cities and countries.

1. Intemperature of the air, or a series of unusual and irregular weather, lays the foundation for acute diseases in a congregated mass of human beings.

2. Deficient or unwholesome food predisposes the bodies of the poor, especially, to be acted upon by this intemperature.

3. Local impurities, composed of effluvia from putrefying substances, in the vicinity of marshy situations or of large filthy cities, in proportion to their extent and to the concentration and virulence of the miasmata, aggravate the preceding causes by a partial pollution of the air.

4. Human secretions and excretions, hurtful in this state of the body even without actual disease, but become virulent by accumulation, and poisonous when subjected to fever, acquire a degree of malignity which is proportioned to the congregated mass.

Hence, if the air, and the soil, and the food, and the state of the animal secretions contribute each a part to the production of a pestilential fever, it cannot be said that the cause resides wholly in any one of them. From the combined effects of all, however, a predisposition is formed which makes some inhabitants of a town or city liable to pestilence sooner than others, some towns or cities sooner than others, some nations sooner than others, in proportion as they have been subjected to the causes before mentioned. If so many causes did not successively concur to this effect, pestilence would be much more common than it fortunately is. We do not depend, therefore, upon the casualties of arresting contagious intercourse, or of expurgating imported *fomites*, but upon the rare concurrence of the several subordinate causes, for our exemption.

And if the prudent adoption of some salutary regulations should prove availing, even in the very time of a pestilential visitation, to lessen the mortality and to mitigate the disease, as they have been often found to do, much more should such measures prove availing, as preventives, when practically adopted in any city, as the constant and habitual means of preservation.

Now, unquestionably, the removal from close and filthy habitations and a vitiated neighbourhood to a pure air, if such can be found; and the separation from each other, and dispersion over a large space of healthy ground, of the distressed multitudes who are thus predisposed, and the supply of sufficient and wholesome food to them; and cleanliness in their persons, clothes, and apartments; have been fully ascertained to be the best prophylactics, even in time of pestilence, which human skill can devise, and the surest means of arresting this formidable evil. The citizens of the United States

know well what security lies in these means : the principles are not visionary. And here we must protest against the unscientific attempt to establish a specific difference between the Levant plague and the yellow fever, as to the former possessing a contagious property, and the latter none. It is astonishing that a physician with a mind so energetic as Dr. Bancroft possessed, should have wasted his strength with so much pertinacity in that ineffectual labour. Too much stress has without question been laid upon contagion in both diseases. To take this quality, which is only incidental, from one of these diseases, in order to give it to the other in excess, when it is known that some deny it even to the latter, is not the way to advance our knowledge of this subject. But it might appear invidious to place in contrast with means of preservation and precaution like those just mentioned, the modern European policy of keeping our fellow-creatures, when threatened or afflicted with pestilence, shut up in the hot-bed of disease ; the sick and the healthy within files of bayonets, or in the hold of a vessel with a crowded and exhausted crew. Precautions like these, though in good truth their necessity is much to be doubted, we may not call barbarous and unenlightened, if they be sanctioned by a British senate, nor inhuman, though practised by Christian governments of the nineteenth century, in direct opposition to the benevolent usages of Greeks and Romans, and even modern Pagans ! But we do call barbarous, and unenlightened, and inhuman, the conduct of those members of our own profession at Noya, who, through fear of the contagion, "carried a spear in their hands for the purpose of killing any patient (and the case really happened) who in a fit of delirium might attempt to seize the physician or attendants."* Our abhorrence of such cowardice and cruelty is scarcely to be expressed in any temperate form of words. No reasonable man can doubt that the sacrifice of human life from the unwarranted, and, in its effects, unfeeling dread of contagion, operating as it does throughout all its details of practical application from year to year, is and has been enormous.

But, on the other hand, to maintain that indiscriminate intercourse may be allowed between the sick and the predisposed in their impure dwellings, and that human beings may be cooped up together, in plague or yellow fever, or Indian cholera, or malignant typhus, or dysentery, without adding either to their own danger, or to that of their attendants, is to take that ultra view which is opposed to the experience of all ages. We do not want nice distinctions about a contagious and infectious atmosphere for practical purposes : they are terms which give occasion to many words and to little practical good. The effects of each have been overstated, and of none more than of contagion, when viewed apart from other circumstances. Contagion of any disease can do but little harm at any time, in any country,

unless there be a strong predisposition of body concurring with a pestilential season. The signs or indications of this pestilential season, and the way to remove this predisposition, are of far more consequence than the precaution against a foreign contagion. Judicious and moderate physicians are more and more tending to this view of the subject.

Contagion is not a necessary incident of any disease ; but some look upon it as constituting the very essence. A few brief remarks on this subject may perhaps be suitable in this place. The public are wearied with statements from medical men, that such and such diseases, of an epidemic nature, are contagious, and that they are not contagious. They may well wonder at the imperfect state of a science which has not yet settled points of so much importance. What are thinking men to conclude when they see medical authorities thus opposed to each other ?—either that the opinion of the most eminent physicians is good for nothing, or that both parties are right—in fact, that under peculiar circumstances, these diseases are sometimes contagious and sometimes not. But it is a great misfortune that partial observers allow their minds to be tintured with exclusive opinions, of which they become as tenacious as if these opinions could be verified by an undoubted demonstration. The consequence is, that little weight attaches to either side. It is too much the habit of all persons to look at pestilential fevers of every kind, as if contagion was the quality which peculiarly characterised them. But a very simple view of the case should convince any one that the animal effluvia, or morbid secretion from a diseased body, which constitutes contagion, is not necessarily a poison to all who come within its influence. Small-pox contagion itself is inoffensive to thousands. In those who have had the disease the predisposition is destroyed. There must be a strong predisposition of body to receive the contagion of any other disease ; and this strong predisposition is what lays the multitude prostrate before an epidemic pestilence : so that, in some cases, an intense dose of the poison ; in others, its protracted application ; in others, an exhausted state of the body from defective nourishment ; in others, extreme fatigue and watching ; with mental depression ; in others, the debility which follows a debauch ; proves, one or the other, to be the exciting cause which brings this predisposition into action while the epidemic constitution, whether this depends on the air, or the body, or the season, is prevailing. It is no fanciful idea that an epidemic constitution is thus limited ; for how otherwise could it happen that cholera, like influenza, requires but six or eight weeks to run its course, to become, in fact, mild and impotent, after it has raged with fury ; while the Levant plague and the bilious pestilence or yellow fever take up three or four months ? If cholera halts days between the first few cases, pestilential fever halts weeks. Cholera observes precisely the same law as pestilential fever, when epidemic : it is violent and fatal at the beginning, mild and harmless at the de-

* Quarterly Journal of Foreign Medicine, No. 5, page 7.

cline; and, if its contagious nature were as well marked as that of plague, we should have the not less remarkable fact, that when it was most violent, and acute, and fatal, it was least contagious, except at the decline, when, as in the plague, contagion is extinct.

The preceding remarks have occurred in relation to the predisposing causes of pestilential diseases, which, perhaps, in most cases, go nine-tenths of the way in producing an attack of the disease, or only wait for some exciting cause while the body is already on the verge of pestilence. It remains to offer a few observations on the precursor diseases.

That no pestilence comes alone, or without some heralds of its approach, seems to be a truth fully established in the unvarnished history of every such event. In most places it is the crisis of a series of fatal and uncommon diseases. The forerunner of plague is usually a malignant fever—of yellow fever, a fatal remittent; which often appear again at the decline. The difficulty of distinguishing between this malignant fever and the pestilence itself has never failed to excite dissension among the faculty, both as to the name of the disease and as to its contagious property. These disputes belong essentially to the present state of opinion on this most important subject; and until correct views prevail over Europe, there will not be a pestilential visitation without them. We can easily account for this difficulty; for what nature has joined, both in series and affinity, man has attempted to disjoin. Physicians, therefore, have perplexed themselves with the most unaccountable dilemma that ever found its way into any science. They have acknowledged a disease called malignant fever, which has ushered in an epidemic pestilence, *to be their own*, or at least the product of the country where it appeared; but as soon as a little change in its character has taken place—which amounts to nothing more than a change in degree, not nearly so great as that which takes place in the pestilence itself, in the short course of its career—which change in a few months is put off again, *then* it is to be accounted of foreign origin, and ships and goods are condemned as the supposed channels of introduction; or it is well if even human life, as has often been the case, does not pay the penalty. The word contagion, with the fears attached to it, has been suffered to preoccupy the minds of statesmen and of many eminent practitioners to such a degree as to destroy all scientific research, to send them hunting after an *ignis fatuus*, which never yet was found, and to cause them to neglect those wholesome internal regulations which, if well observed, might bid defiance to all foreign contagions, supersede quarantine, and in great measure relieve commerce from its present injurious restraints.

With respect to that law of pestilence above alluded to, according to which other forms of acute disease are banished while the epidemic pestilence continues to prevail, it is absolutely incredible, or at least inexplicable on any sound principles, that one epidemic disease—whether plague, or bilious pes-

tilence, or yellow fever, or cholera—which banishes a whole host of other epidemic diseases from any country while it is raging, and then suffers them to start up when it is about to disappear, should owe its origin to any other place than to that country. It is quite incredible that the fortuitous importation of a foreign contagion should so entirely change the atmosphere of a country, on which its minor epidemics manifestly depend, as to drive them away in this manner, in order that it may exercise the power of destroying alone, until it shall withdraw itself to act the same tragedy in some other place; not only so, but that the presence of this foreign disease should restrain for the time the operation of the ordinary causes of mortality from the common acute and chronic diseases to which the inhabitants are liable, which is known to be in great measure the case during the rage of an epidemic pestilence.

We might also lay some stress upon the fact that, with singular power of selection, an epidemic pestilence chooses its own season of the year, from which it is observed to vary but little in the same country or climate, both to begin and to conclude its ravages.

If, in addition to these things, we consider the epidemic pestilence itself, and its varying features and character in its short career, we can arrive at no other reasonable conclusion than that it originates entirely where it rages. We have seen that no pestilential epidemic is one form of disease, of unvarying type and destructive power, from the beginning to the conclusion; nor, by the admission of the great advocates of contagion themselves, of equal contagious property in its different stages, if indeed it be possible to ascertain this point, which is a question; and the question hinges upon the very slight degree of contagious property manifested at the commencement, when the disease is most malignant and most fatal, as well as upon the acknowledged extinction of contagious property at the decline.

By these facts we are compelled to admit that such a change takes place in the air, or in the state of the miasmata from the soil, or in the human body, perhaps in all together—a change so extraordinary as to alter the type and character of a pestilential disease from a fierce to a mild state, and to expel it entirely, destroying every vestige of contagious property in it; but according to the doctrine of imported contagion, we must not admit that any combination of indigenous causes can produce it.

We are called upon by the facts to admit that the precursor malignant fever, which is so nearly allied to plague that the most sagacious physicians have allowed their inability to distinguish them, is an indigenous disease; but, in condescension to common opinion, we must persuade ourselves that the disease which expels this native malignant fever, and that only for a time, is *foreign*! It is marvellous that men of science could ever have been influenced to lend their sanction to such incongruous notions. But, in truth, the difficulty

of ascertaining the real facts has been the cause of much erroneous opinion.

Upon principles which allow of the domestic origin of pestilence, we can more easily explain the singular facts so frequently recorded in the annals of epidemic diseases, relative to the exemption of foreigners, as well as of the inhabitants of other cities, in a place visited with pestilence. Many facts seem to indicate that it is not the *immediate* state of things only which is to be taken into account, in order to explain the true causes of pestilence; but that the undermining effects of some remote causes, which have been some time in secret operation in certain communities, ought also to be considered; for it is abundantly proved that a peculiar constitution of the air, on which the progress of pestilence in part depends, will not of itself induce the disease in strangers even holding intercourse with the sick inhabitants, without a fit habit of body to receive it. And, on principles like these, we can account for the escape of such inhabitants of the place as are living in clean secluded situations, enjoying all the necessities of life, and but little exposed to the exciting causes—as in well regulated hospitals and abbeys—far more satisfactorily than on the supposition that they have been guarded from the contagion.

It is scarcely necessary to recapitulate the facts illustrative of the same views, and establishing the same principles, which belong to the exemption of those cities from the ravages of pestilence, where the wise regulations of cleanliness and attention to the poor have been adopted; and, conversely, the continuing liability of those in which these wholesome rules are neglected.

If we wanted evidence of every other kind, the testimonies of those who have superintended lazarettos and quarantine stations, furnish an argument of no small weight against the doctrine of imported febrile contagion having in any case been a cause of general pestilence; for the confused and contradictory accounts of the supposed channels by which contagion has been alleged to be conveyed into different countries, of which many examples could easily be furnished, might of themselves occasion serious doubts upon the subject.

In conclusion, the separate points of evidence, added together and weighed impartially, constitute a theory or system of connected observations and dependent results, tending remarkably to establish the opinion, with as much certainty as the case will admit, that the whole apparatus of an epidemic pestilence, from beginning to end, is the production of the country where it rages.

(T. Hancock.)

EPILEPSY.—Every one is aware of the difficulties with which the consideration of this disease is encompassed, especially with regard to its etiology—difficulties which we have no expectation of removing; nor can we hope materially to add to the information which is already before the public relative to the method of treating epilepsy; but we are willing to put

our mite into this treasury of medical lore: and being persuaded that those who are afflicted with epilepsy may often be made less wretched by rendering its paroxysms less frequent, even when the patient cannot be perfectly cured, we willingly avail ourselves of the present opportunity of urging physicians to re-consider this disease with care, and no longer, as many of their brethren have done, to pronounce epilepsy, when unaccompanied with deformity of the cranium or imbecility of mind, incurable, until, first, they shall have endeavoured to correct in the patient every function which is disordered, and until, secondly, they shall have exhausted the whole armoury of the empiric.

Indeed, it would seem that all those diseases which have been termed *opprobria medicinæ* ought to be revised with care, were it only to seek for new and more effectual palliatives. Every year, by the industry and ingenuity of the naturalist, the chemist, and the mechanist, new agents or more refined expedients are discovered for abating the discomforts caused by infirmity and pain; and nothing is more commendable in a physician than being familiar with all those resources of art by which incurable diseases can be alleviated. The euthanasia is a subject worthy of increased attention. The name of Ferriar, who wrote a paper on the treatment of the dying, ought never to be mentioned without an honourable addition, on account of the humanity which guided his pen upon that occasion.

There exists yet another reason why epilepsy should be investigated with renewed attention. This disease has often brought candor and cunning, science and ignorance, into conflict: in the treatment of epilepsy the empiric, ignorant and bold, and often confident in proportion to his ignorance, is, in the estimation of the world, superior to the physician who is influenced by true principles of science and morality. The physician ought to use all proper means of preserving epileptics from falling into the hands of the designing, whose nets are ever extended to catch the unwary. He ought to avail himself not merely of science and observation, of the advantage which he obtains from being enabled to prognosticate where an ignorant person can only guess, but also of prudent reserve, time, and favourable contingencies;* and he ought not to forget that epilepsy will often spontaneously terminate, which favourable termination nine-tenths of the community, educated and uneducated, patients and their friends, in spite of a disclaimer on his part, will attribute to the last medicine

* The following are instances of these contingencies. Puer decem annorum, jam a tribus annis epilepticus, frustra adhibitis multis remediis, corripitur febre epidemica, pluribus molestis symptomatibus stipata, et feliciter superat hunc morbum, et postea ab epilepsia immunis manet. Miscell. Cur. Dec. iii. Ann 7 and 8, p. 2:8. Fuere quibus excitatus morbus, et nutritus, opipara ac desidiosa vita, subita fortunarum jactura per omnem vitam, haud contemnenda plane compensacione, siluerit. De Haen, pars v. Rationis Med. cap. v.

prescribed, according to that established aphorism of popular wisdom, *post hoc ergo propter hoc*.

Epilepsy, ἐπιληψία, (from ἐπὶ and λαμβάνειν), so termed from the suddenness of the seizure.

Synonyms. *Morbus divinus*, *M. herculeus*, *M. sacer*, *M. comitialis*, *M. caducus*, falling sickness, *mal caduc*, &c. Many of these appellations prove the dismay with which the spectator is affected upon witnessing this frightful disease. When a person, with whom, perhaps, one was engaged in agreeable conversation, and who apparently was in perfect health, suddenly losing all sense, is thrown down and reduced in appearance to a state of hopeless agony, it is not wonderful that, in the days of ignorance, general amazement should have been the consequence; nor that, during the reign of superstition, the frightful scream and struggle of epilepsy should seem to argue the interposition of an offended deity, in this emphatic manner testifying disapprobation of passing events. Thus did the most politic nation of antiquity interpret the occurrence of epilepsy during public business, nor did they hesitate to dissolve a meeting the moment that so apparently portentous an interruption took place.

Even now, when the mind is strengthened by true religion, which, by calming the spirit, adds to the powers of observation and of reasoning, and is destructive of superstition, and which, moreover, imparts just views of the divine government, the occurrence of epilepsy is productive of awe in those who are gifted with reflection; not as manifesting any disturbance in the established order of nature, but as a striking and salutary evidence of the uncertainty of health, a gift generally prized by mankind above all others.

Paroxysm.—The scream with which epilepsy usually commences is one of the most startling sounds that can be uttered. In female auditors it has produced an hysterical fit, abortion, or, as it has been said, eclampsia. We have known it produce in an animal an effect which, although not without something ludicrous in its nature, is calculated to exemplify its astounding harshness. A young lady, while in the drawing-room of an eminent physician, waiting the assembling of a consultation summoned to consider her case, was suddenly attacked with epilepsy. She uttered a scream so piercing, that a parrot, himself no mean performer in discords, dropt from his perch, seemingly frightened to death by the appalling sound.

When, horror-struck by the scream, we turn to the patient, we often find him labouring under a general spasm, more especially of the extensor muscles; his eyes may be discovered fixed and staring, his eye-brows contracted and lowering; he appears to draw back from the beholder with a fixed and threatening look, which, however, it immediately becomes apparent, is but a senseless gaze. The complexion in some epileptics is leaden, in others it is flushed even to duskiess; the muscles are in alternate relaxation and vehement con-

traction, the spasms being what are called clonic. In a girl who was for some time under our care, so violent were the muscular contractions, that her arm was found dislocated after every fit, until by a proper bandage, which she always afterwards wore, this accident was prevented. Burserius describes a similar accident, and tells us that he once attended a young lady whose jaw was found dislocated at the end of a paroxysm; and several authors have observed the teeth fractured by the violent contraction of the muscles which elevate the jaw; the tongue is often protruded, and is then almost always bitten, sometimes nearly through; frequently the sides of the tongue, after the fit, are found ragged and bleeding, having been gnawed by the teeth; from the wound in the tongue, the frothy saliva which is forced from the mouth is often tinged with blood; the neck appears swollen; the eyes roll, or are fixed in a hideous squint, which sometimes continues after the paroxysm is over, and even has been permanent;* rapid nictitation takes place, and the mouth is sometimes strangely distorted. The abdomen is distended with flatus productive of borborygmi. The diaphragm, abdominal muscles, and muscular coat of the bladder, overcoming the resistance of the sphincters, expel the fæces and urine with violence, nor is a discharge from the vesiculæ seminales uncommon. The pulse is rapid, especially at first, but varies much; it is generally full and strong towards the end of the fit, when sweat flows, especially from the head and neck. The breathing also varies; sometimes it is sibilous, sometimes stertorous; sometimes the lips are puffed out by every expiration; at last the breathing becomes full and uniform. The violence of the convulsions gradually abates, and the strong muscular contractions give way to subsultus tendinum; and at last the patient, perhaps previously heaving a sigh, is restored to a degree of recollection; soon after which, exhausted by the violence of the struggle, he drops into a profound sleep, from which he awakes unconscious of his illness, unless admonished of having had an attack by a severe headache; by the state of the tongue; by discovering that there has been some involuntary discharge, which experience has taught him to connect with the fits to which he is subject; by extreme exhaustion, which may continue for several days; or by discoloration of the skin from ecchymosis similar to that which often occurs in whooping-cough.

Death has taken place unexpectedly in a paroxysm of epilepsy, occasioned, as it is thought, by respiration being suspended by spasm of the glottis, or by congestion of the vessels of the brain.

The attacks of epilepsy are not always attended with so horrible a struggle as that which

* *Oculorum bulbos incredibili celeritate sub palpebris clausis rotari observatur, unde in musculis oculorum moventibus magna distractio fit, et incurabiles sæpe tota vita oculorum distorsiones manent.* V. Swieten Comm. §. 1077.

we have described. Sometimes the patient is seized with sickness or great faintness; his sight becomes dim and uncertain, and recollection is lost, together with all muscular power, so that he slips from his chair or falls from his horse, and when his friends run to his assistance, they find him pale and bedewed with cold perspiration, perhaps insensible, but not convulsed. Occasionally he obtains great relief from vomiting; but generally he continues sick, languid, and confused during the remainder of the day. These attacks may often be traced to indigestion, and sometimes require nothing more for their removal than attention to the state of the stomach.

There is yet a slighter paroxysm to be described, indeed so slight that its nature is generally overlooked by the patient and his friends. It takes place thus: the eyes of the patient suddenly become fixed and vacant; if he be in conversation, sometimes he tries to prolong it in a slow, monotonous, gibbering manner. This attempt, narrowly scrutinized, would seem merely an abortive effort to articulate the last word which he had uttered, and which he mumbles for half a minute or a minute, and then recovering, he takes up the thread of his discourse, being soon aware of an interruption of consciousness, which interruption we have sometimes seen an artful attempt to conceal. Some individuals have described this state as one of great mental distress, of perplexity and depression, like a frightful dream; they have an imperfect reminiscence of some overwhelming calamity, or a sense of remorse, for which they cannot assign a cause. This paroxysm is like a short mood of extreme melancholy, at least such an impression the countenance of the patient, which is full of sadness, makes upon the spectator. The returns of these attacks are frequent; they occur several times a day with some. They who are thus affected seldom escape for many days. That this slight and transient attack, which has been called by some French writers "*vertige épileptique*," is truly an epileptic paroxysm, we are of opinion from having observed the chain of thought completely broken; from having seen it in persons who had been affected with falling sickness in its severest form; from having known falling sickness affect patients who had suffered under these slighter fits, and from a recollection of the slighter and more severe attacks being alternate in the same individual. This affection is alluded to by Burserius,* as well as certain other attacks, in which a clonic spasm of only some parts, as of an arm or only of the face, takes place, or in which *all* the senses are not overwhelmed, in the following terms: "There are, moreover, certain degrees of approximation to epilepsy in which the senses are interrupted only for a moment, and scarcely any convulsive motion, or only a very slight one, takes place, the patient not falling to the ground, but continuing to stand. These I should rather name epileptic attacks than actual epilepsy. But if

they are neglected, a transition first to epilepsy, and next to that which is severe and perfect, in general gradually takes place." Heberden briefly describes this affection as follows: "*Postremo animæ defectio levis, quæ modo antecedit justam epilepsiam, modo quasi vicem ejus implet, dum nihil aliud æger sentit præter oblivium quoddam, et delirium adeo breve ut fere ad se redeat priusquam ab adstantibus animadvertatur.*"*

The following case of this sub-epileptic seizure was written by the patient herself, (C. S. æt. 37,) and is highly illustrative. "Even when a girl, I was very nervous, sometimes loosing all my strength. I have also been liable to a complaint in my liver, for which I was rubbed with mercury. I have had working and uneasiness in my feet, which was quite painful. Now, at times while speaking, or while any one is speaking to me, I get a confusion on the subject about which we are conversing, which used to last for some time, but does not now for more than a minute, and when it is gone I have a most violent palpitation. I have it now much oftener, but it does not last so long. I am told I grow pale round my mouth and look rather melancholy for the time, and fix my eyes upon the person with whom I have been talking. I at the same time work my hands, from having a most uncomfortable feeling in them. I am told I always make a noise in my throat, and moan; but of this I am not conscious, and I seem to be in a tremble, my hands shaking. I am tormented with a pain which goes from my chest to my back-bone, and prevents me from drawing my breath, and gives me an inclination to sigh. From my head to my feet I am at times in pain, and I feel as if there were a heart beating in every part of my body. A numbness comes in my hands, particularly at night, and then I have no feeling in my fingers, till by rubbing I get it back. Occasionally I have had numbness and coldness in my tongue. A lump came in the outside of my throat, which often returns with violent throbbing. This I have every evening."† In this patient there was great irregularity in the uterine function. In truth, this was a specimen of uterine epilepsy intermingled with hysteria, which was aggravated by continued anxiety of mind and a diet much too stimulating.

In the much greater number of patients the paroxysm of epilepsy occurs without warning,‡ but some are admonished of its approach by symptoms referable to a disturbed state of the

* Heberden Comm. cap. xxxiii.

† Perhaps we may be allowed to observe that a swelling of the thyroid gland, which is often a symptom of hysteria, has not, as far as we know, been sufficiently attended to. This swelling sometimes disappears and returns, but is more commonly permanent; in its external character it is not distinguishable from bronchocèle.

‡ Sur cent malades, on en trouve a peine quatre ou cinq dont les attaques soient précédées et annoncées par des symptômes précurseurs. Chez les quatre vingt quinze, ou quatre vingt seize autres, l'invasion de l'attaque est subite. Georget, Dict. de Médecine, Art. *Epilepsie*.

* Burserius, vol. iv. §. 264.

brain or of the external senses, similar to those which are premonitory of apoplexy; as for instance, excitement of the mind; throbbing in the temples; turgescence of the veins of the neck; flushing of the face, with cold extremities; giddiness, weight, headach, drowsiness, forgetfulness; disturbed rest, frightful dreams; irritability of temper, despondency; inarticulate speech; flashes of light or sparks of fire seen in the dark; tadpoles, moths, flies, chains, or cobwebs, appearing before the eyes; coloured areolæ around the candle, or any other luminous body; dimness of sight, or only one portion of an object distinctly visible; hissing, ringing of bells, roaring of the sea, or other discordant noises heard; strange and unpleasant odours smelt; disagreeable tastes occurring; numbness in the course of a nerve, or tremblings or convulsions in a limb mounting upwards. Watching or delirium sometimes precede a fit, during which ghosts and apparitions are supposed to appear; and as the fit does not always follow the illusion, many of our ghost stories and supposed visions doubtless have arisen from threatenings of epilepsy or of apoplexy. We knew an individual subject to epilepsy who believed that his mother had visited him after her death. Disorders of the digestive organs frequently precede epilepsy, as pain in the abdomen, salivation, sickness, vomiting, looseness. Sometimes the paroxysm follows hysteric symptoms, sometimes obstructed or painful menstruation; or, lastly, the attack follows the *aura epileptica*, which is a sensation as if a current of air, stream of water, or slight convulsive tremor ascended from a part of the body, or of the extremities, to the head; when the aura reaches the head, the patient falls down in convulsions. This sensation has first been felt in, and seemingly has arisen from, various parts of the body; from the toe, foot, leg, groin; from the finger, hand, arm; from the bottom of the spine, uterus, loins, abdomen, and chest.

Here we would observe, that the epileptic fit does not always take place when the patient is thus menaced with it. Premonitory symptoms of epilepsy often occur; not only vertigo, headach, false perceptions, but convulsions in a limb, or in one side of the face, similar to those spasms to which Bursarius alludes, with weakness, headach, and a degree of stupor; after which the patient recovers, without the convulsions becoming universal, or insensibility being complete. Dr. Prichard considers these as attacks of partial epilepsy, under which head they are described by that eminent pathologist. To us it would rather appear that, like the aura, they are mere threatenings of a fit.

In some patients epilepsy is congenite, in others it commences in childhood, in others in youth, manhood, and even in age. Sometimes, when previously established, it subsides at puberty; and sometimes, especially in females, the disease commences at that important epoch. There is much variety and uncertainty with respect to the return of the

paroxysms. The attacks have been periodic, but much more generally they are irregular in their recurrence. Months, nay years, may intervene between the severer attacks, while the slighter may return daily.* We have preserved no list of the epileptic patients by whom we have been consulted, and cannot state the proportion of males to females, but our impression is that we have seen many more of the former than of the latter; hence the observation of Heberden, distinguished for his accuracy, is, we presume, true with respect to epilepsy as it occurs in the upper and middle ranks of society, "*Feminæ tamen rarius quam viri in eam incidunt.*"†

We have known individuals subject to epilepsy preserve their intellect unimpaired in old age. A very dear friend who was liable to epilepsy, died a few months ago in the seventy-fourth year of his age, whose comprehensive, well stored, and active mind remained unclouded till within a few weeks of his death. But it is often otherwise; many become corpulent, indolent, dyspeptic; others are affected with paralysis, apoplexy, or veternus, or sustain gradual inroads on the intellect, which lead to amentia, the relations of things being no longer perceived or recollected by them: like mere machines, they act as they are induced to do by external influence; no longer able to originate any thing, when they receive an impulse they are carried on as it were by mere habitual training, the power of modifying their conduct by circumstances as they arise being lost. They generally sit all day long staring and drivelling, inattentive to the calls of nature; so that at last their most sanguine and affectionate relatives, despairing of their recovery, become anxious for their death as a release from suffering and degradation. The change which takes place in the expression of the countenance cannot be better described than in the words of M. Esquirol. "*Les traits de la face grossissent, les paupières inférieures se gonflent, les lèvres deviennent épaisses; les plus jolies visages enlaidissent, il y a dans le regard quelque chose d'égaré, les yeux sont vacillans, les pupilles dilatées. On voit souvent des mouvemens convulsifs de quelques muscles de la face.*"‡ While we transcribe from Dr. Cooke's valuable work on nervous diseases the following descriptive passage from Aretæus, we would have the reader take note that it is applicable chiefly to the extreme cases of the *epilepsia cerebialis*. "If the disease be of long duration, patients suffer from it even in the intervals of the paroxysms; they become torpid, languid, and dejected; they avoid the sight and society of men; time does not afford any mitigation of their sufferings; they are often oppressed with watchfulness, and when they do sleep they are terrified with horrible dreams; they loathe food, and digest with difficulty; their natural colour

* Heberden relates a case in which there was an interval of thirteen years between the first and second paroxysm.

† Heberden Comm. cap. xxxiii.

‡ Diction. des Sciences Méd. vol. xv. Art. *Epilepsie*.

disappears, and changes to a leaden hue; they have a difficulty of comprehension on account of torpor of mind and of sense; they are dull of hearing, are affected with a ringing of the ears, and a confused sound in the head; the tongue is unable to do its office, either on account of the nature of the disease, or from injuries which it may have received in the paroxysms; they are agitated by convulsions, and sometimes the mind is so disturbed by the complaint, that persons labouring under it become fatuous or idiotic.”*

Species of epilepsy.—This disease has been divided into the idiopathic and sympathetic species, the former embracing the cases which depend upon an affection of the brain, the latter the cases which depend upon an affection of parts remote from the brain—the *epilepsia cerebialis* and the *epilepsia sympathica*. With respect to the *epilepsia occasionalis*, which is the third species of Cullen, most of its specimens may be considered merely as convulsions symptomatic of other diseases. Thus the *epilepsia traumatica*, *e veneno*, *e scabie retropulso*, a *hæmorrhagia nimia*, a *debilitate febricosa*, *ab hydrocephalo*, &c. ought to be treated of under the head of wounds, poisons, &c. or if considered not as symptomatic, they ought to rank under the head of eclampsia, an acute disease, of which the paroxysm may never be repeated, and not under epilepsy, which is a chronic disease and recurrent.

It must not be denied that it is not always an easy matter to distinguish between the *epilepsia cerebialis* and the *epilepsia sympathica*: the rules for discriminating the one from the other, laid down by authors, are by no means implicitly to be relied upon; and, as the decision of this point is not always practicable, the physician, in the course of an attendance, will sometimes have to change his opinion, for which he ought to be prepared. A dictum of the celebrated Cullen, namely, that in the *epilepsia cerebialis* there are no premonitory symptoms, while the *epilepsia sympathica* is generally announced by an *aura frigida*, has not been confirmed by our observation.

In our endeavour to determine the species to which a case of epilepsy belongs, we may proceed as follows:—First, we may inquire into the state of the natural functions—the state of the appetite, digestion, and nutrition, and into the condition of the secretions and excretions; then into the state of the nervous system; and lastly, if the patient is a female, into the functions of the uterus, especially with respect to menstruation. If we are unable to detect any affection of the nerves, any local irritation, or disorder of a part remote from the brain, we may with probability consider the case as a specimen of the *epilepsia cerebialis*.

In this conclusion we may repose with more confidence, if we discover that the disease is inherited; that the patient has been liable to vascular congestion in the brain from deter-

mination of blood to the head, increased action in the arterial system within the cranium, or obstruction in the system of the veins, to be inferred from flushing of the face, throbbing in the temples, epistaxis, vertigo increased by stooping, dulness or weakness of intellect, tightness across the forehead, headach, false perceptions; that there is any thing peculiar in the form of the head, or expression of the countenance; and that the habits of the patient have been such as to produce considerable or long continued excitement of the brain. Paroxysms of epilepsy which occur late in life in persons who have had apoplexy, or whose diathesis is apoplectic, rank under the *epilepsia cerebialis*; as also do those cases of not unfrequent occurrence, in which epilepsy almost invariably leads to an attack of insanity; cases which differ in two respects from the more common form of periodic insanity, 1st. in commencing with an epileptic fit; and, 2dly, in the mind being much sooner restored to sanity—derangement continuing sometimes only for a few days. It may, however, be worth while to observe, that while differing in these respects, the mental disturbance which follows epilepsy, and *mania periodica*, require the same method of treatment.

Of the *epilepsia sympathica* there are five species, viz. that in which the brain sympathizes with a disordered state of the stomach, of the liver, of the nervous system, of the uterus, or with any part of the body suffering from pain or irritation. The following, then, is our arrangement of the subject:—

I. *Epilepsia cerebialis*.

II. *Epilepsia sympathica*.

Sp. 1. *Epilepsia stomachica*.

- 2. — *hepatica*.
- 3. — *nervosa*.
- 4. — *uterina*.
- 5. — *a dolore*.

1st species.—In addition to many of the common symptoms of indigestion, such as a loaded tongue, unpleasant taste, acid or rancid eructations, *cardialgia*, heavy breath and perspiration, high-coloured urine, fulness of the hypochondria, and foul discharges from the bowels; the appetite in the *epilepsia stomachica* is extremely irregular and capricious; sometimes it is defective, often canine, and a sense of distention of the stomach takes place after meals. Even while the demand for food is exorbitant, it will often lie in the stomach undigested for two or three days; this is frequently the case about the time of a paroxysm, shortly after which we have known an enormous quantity of half digested food vomited, part of which had been eaten at least two or three days before. “*Epilepsia stomachica ea est quam fovet et excitat crapula; cardialgiis, ructibus, anorexia, dyspepsia, nauseis, vomitione, prægressis.*” Sauvages, cl. iv. g. xix.

2d species.—The liver more than the stomach would sometimes appear to be the organ in which this disease originates. Cases have been reported to us in which paroxysms of epilepsy were invariably preceded by change in the

* Dr. Cooke on Nervous Diseases, vol. ii. p. 24.

complexion, and pain and tenderness of the right hypochondrium; and in which by great attention to the liver, when its function became disturbed, attacks of epilepsy have been averted. We learn from Bursarius, that, in certain cases, epilepsy is preceded by pain in the region of the liver, icterus and symptoms of calculi in the gall-bladder; and from Dr. Prichard, that he has witnessed several cases of epilepsy wherein the symptoms which point out the existence of chronic diseases of the liver were clearly discernible. The following is a brief case of the epilepsy hepatica.

"May 6, 1827. Mr. ———, of a highly scrofulous diathesis, has been affected with epilepsy for several years. The fits commenced at the age of thirteen, and were for some time very frequent in their recurrence; what remedies were employed at first does not appear, but of late he has tried a variety of quack medicines. About twelve months ago, after a rapid succession of paroxysms, he consulted Dr. Casey, of Cork, who found him complaining of pain and soreness in the right hypochondrium, his complexion being at the same time sallow, and his stomach disordered, and by whom small doses of a mercurial medicine and bitters were prescribed, by means of which these symptoms were removed, and there was no return of epilepsy for some months; after which, in November, symptoms of great hepatic disorder returned, of which two paroxysms of epilepsy apparently were the consequence. Since which he has had no paroxysm in a perfect form; but he has experienced symptoms which formerly had forewarned him of an attack, and which he designated a "nervousness," namely a sudden tremor with a momentary but slight convulsion, at which time there was always more or less disorder of the hepatic function; when these symptoms occurred, a brisk mercurial purgative was given, and under this simple treatment he has enjoyed a longer exemption from convulsions than since the commencement of his illness."

3d species.—In pursuing our investigation, we ought next to endeavour to ascertain whether the patient, if a female, is labouring or has laboured under hysteria; whether she has been liable to rapid palpitation of the heart, sudden failure of strength, faintings without loss of consciousness, entire loss of voice, anorexia, or any of the more palpable symptoms of hysteria, as the globus or clavus hystericus. Nay, although there be no symptom of hysteria, causes which produce that affection may have been in operation prior to an attack of epilepsy, as sedentary occupation in a close and cold apartment, insufficient food, depressing passions; and if so, much light may be thrown on the case through a knowledge of the diathesis of the patient. Nor ought the inquiry respecting the symptoms which characterize hysteria to be confined to the female; for symptoms which no one would hesitate to call hysterical, if occurring in a female, may frequently be detected in males subject to epilepsy, who are of a nervous temperament or hypochondriacal;

and hence, that we may include both sexes, this species ought to be called *epilepsia nervosa* rather than *epilepsia hysterica*, hitherto the term which has been applied to it.

In patients liable to *epilepsia nervosa*, there may sometimes be observed preceding a paroxysm, an excessive irritability with jactitation, weakness, tendency to delirium, suspicious breathing requiring a constant supply of fresh air; or tinnitus aurium, vertigo, and the wildest hysteric delirium.

4th species.—An inquiry into the condition of the uterine function will sometimes discover the nature of an attack of epilepsy, which may be connected with obstructed menstruation or dysmenorrhœa. The *epilepsia uterina* arises and returns at or about the period of menstruation; sometimes for the first time at puberty, and often in consequence of those causes which check menstruation, as damp and cold feet, excessive fatigue, great anxiety of mind or alarm. In our opinion this species ought to stand apart from the third species, with which it is generally identified, but from which it differs both in its causes, exciting and predisponent, and in the method of treatment which it requires.

5th species.—To this species of the disease belong cases of epilepsy originating in injuries, in which the nerves are wounded or lacerated, or arising from diseases of the nerves. In the Edinburgh Medical Essays and Observations,* a case of this nature is related, in which epilepsy was caused by a cartilaginous tumour of the size of a large pea, which was situated on a nerve. Upon the excision of the tumour the fits ceased. In the same work there is an account of convulsions being caused by a concretion of the size of a nut pressing upon a branch of the sciatic nerve. One such neuralgic affection we have witnessed, but we rather think the convulsions in that case were not strictly epileptic. To this species, also, belong the affections described by La Motte, in which epilepsy was caused by calculus in the pelvis of the kidney: one epileptic, after a violent paroxysm of the disease, voided five calculi, and had no return of the fits.† As these cases, however, are rather within the province of the surgeon, we shall not revert to this species of the disease when we come to explain the treatment of epilepsy.

It must be acknowledged that the symptoms which, in distinct groups, give a specific character to a case of epilepsy, are in some instances confusedly intermingled, whereby the symmetry of our attempted arrangement is disturbed, and, what is of much more moment, the remedial process rendered difficult by contra-indications: thus it would not be easy to say to which of the foregoing varieties the following case belongs, which is presented, not to discourage the student, who with increasing experience will see more clearly that our division of this important subject is founded on

* Vol. iv. Art. 27.

† Vol. ii. p. 20.

just observation, but to shew him that there are difficulties which it will require persevering study as well as the most attentive observation to conquer.

"In the latter end of harvest, 1829, a young lady, æt. 17, who had not begun to menstruate, of a very sturmount habit, and much afflicted with psoriasis labialis, having a dry, scabrous, branny skin, and being liable to hysteria in an aggravated form, was visited for the first time by a physician just as she was recovering from a paroxysm of epilepsy, several attacks of which she has since had at the intervals of one, two, or three months. After the first attack there was a sense of fullness and tension in the head, with symptoms of hepatic congestion and torpor, all of which yielded to a moderate bleeding from the arm, together with the use of calomel and pulvis Jacobi, followed by a draught of the infusion of senna and the compound decoction of aloes; and subsequently the shower-bath, and diet of easily digestible materials, together with tonic medicines. Her tongue had usually been coated, the digestive function depraved, as appeared from anorexia and a very capricious choice of food; the alimentary canal very torpid, requiring the continued use of various active purgative medicines. The paroxysms appeared some of them to be averted by a pill of calomel over night and a purgative draught in the morning, so that indigestion seemed to be the chief radix morbi."

Pathology of epilepsy.—That there will in general be found, on dissecting the bodies of those who have laboured under falling sickness, some exemplification of diseased structure in the cranium, subjacent membranes, cerebrum, cerebellum, or spinal canal, works of morbid anatomy, and treatises on epilepsy, have taught us to expect: they shew that after death we may count upon finding a part of the contents of the cranium affected through the operation of some irritating cause. In some dissections is discovered exostosis, or thickening of the bone, which indeed may be a consequence rather than a cause of disease; in others, inflammation or ulceration of the membranes of the brain, of its surface or substance; in others vascular turgescence; effusion of various fluids—bloody, serous, gelatinous, purulent; induration or softening of the brain; tumours sometimes are detected, whether scirrhous, fatty, or sarcomatous; and lastly, tubercles or hydatids: but what *may* be disclosed by any one dissection about to be performed, whether an appearance connected with some change in the structure of the bone, membranes, or the brain itself; nay, whether *any* morbid change will be discovered, a cautious physician would not venture to predicate. The following is one of many quotations which we might produce to shew that dissection hitherto has given us but little aid in ascertaining the cause of epilepsy: "Sed et fessi fuerunt summi in arte viri, atque in rebus anatomicis peritissimi, quod in cadaveribus hoc morbo defunctorum nihil invenerint sæpe quod culpæ poterant."*

* Van Swieten Com. s. 1872.

Even the brothers Wenzel, who have produced a monograph on this subject of the highest order, in which we recognize just principles of investigation, ability, and zeal, after an inquiry continued for a good many years, and the careful dissection of above twenty epileptics, confining their observations to idiopathic epilepsy, to the exclusion of those cases, "*en qui cette maladie peut être produite par des vers ou autres causes extérieures et matérielles*," and arriving at a conclusion that the disease is seated in the sphenoidal bone, in the pineal gland, and the pituitary gland, but chiefly in the latter, have added but little to the pathology of epilepsy.

Admitting their conclusion to be just, it will not satisfactorily explain the nature of the disease, nor lead to any practical improvement, the great objects to be obtained from the cultivation of morbid anatomy. There seems to have been the greatest diversity in the appearance and condition of the pituitary gland.*

* As it would appear from a paper placed in our hands by Dr. Tweedie, which was written by his friend Dr. Sims, of London, that in the French translation of the work of the Wenzels by M. Breton, ann. 1811, the German word *hernanhang*, which ought to have been translated *gland pituitaire*, has been rendered *cervelet*, we are induced to lay before the reader in this note an extract from Dr. Sims's paper, in which an accurate account is given of the labours of the German pathologists.

"The Wenzels regard as a pathological circumstance a peculiar thinness of the sphenoidal bone and of this part of the base of the skull, when compared with the ordinary thickness of the other bones; variations in the position, curvature, and size of the clinoid apophyses; which destroy the natural symmetry of the bones of the basis, and occasion changes in the capacity and form of the sella turcica. These have an influence on the brain and pituitary gland.

"The pineal gland, in several cases, was altered in colour; in ten it was a pale grey; a brownish yellow vesicle on its upper surface is noticed; in all it was softened; in nine it was much smaller, in two much larger than natural.

"In the pituitary gland the principal changes were observed, some of which certainly would require the close inspection of a practised eye to discover: an unequal and furrowed appearance of the upper surface—in two instances a muscular appearance as in old people; excavations, or loss of substance of the upper surface; depression along the anterior margin; alterations of colour, as various shades of red verging to black, pale grey, yellow, brownish yellow, and pale white. In three cases it was very soft; in five, firm, compact, and of unnatural hardness, considerably enlarged, with an effusion of thick lymph between the two lobes. In seven, of prodigious size. The most important alterations existed in the interior: in ten cases, at the point of union of the two lobes, there was a yellow, solid, friable matter, which might be raised in bits; this substance almost always (independent of the separation of the lobes) occasioned a loss of substance. In five cases there was a viscid semifluid lymph between the two lobes. Patches of white, or brownish solid lymph on the superior surface of the gland; the anterior lobe enlarged, and containing a substance resembling pus; the lobes joined without intermediate surface; the lobes separated from each other, the upper surface inflamed.

"In some instances the infundibulum was firmer than natural; in one instance an effusion of lymph resembling false membrane was deposited around a

Its colour was not uniform, nor yet was its consistence. In some cases it was very soft, and in others preternaturally hard; and in respect of its size and structure there was also great diversity. The Wenzels, we conceive, have merely opened up a new path—a path which ought to be explored by future inquirers notwithstanding the discouraging remark of M. Esquirol, “de toutes ces recherches, particulièrement de celles de Bonet, de Morgagni, Baillie, Greding, Meckel, Wenzel, que pouvons-nous conclure? Rien, sinon que ces mêmes altérations ont lieu chez des individus qui ne sont pas épileptiques, comme Wepfer, Lorry l’ont prouvé. Avouons franchement que les travaux de l’anatomie pathologique n’ont jusqu’ici répandu aucune lumière sur le siège immédiat de l’épilepsie.”*

Proximate cause.—Nothing can be more obscure than the proximate cause of this disease. As convulsions similar to those which attend epilepsy may be produced by the application of an irritant direct to the brain; as every part of the frame is agitated during a paroxysm—all the external senses often being morbidly affected just before the paroxysm, the whole muscular system agitated during it; and as not only the animal but the vital functions are universally perturbed, the proximate cause must be seated in the sensorium commune, as being the only part capable of exercising such an influence over the whole body; but the nature of the disorder upon which the epileptic fit depends will probably never be discovered. It cannot be vascular distension, since convulsions are often a consequence of loss of blood, (no other cause at the same time operating,) and may be removed by stimulants. It cannot be vascular collapse, since convulsions sometimes depend upon plethora, and are relieved by spontaneous hemorrhage or by bloodletting.

In this disease we are unable to lay hold of the first link in the morbid catenation. It is generally thought that the aura epileptica is an irritation which first takes place in the sentient extremity of a nerve, and is thence conveyed along the affected nerve to the sensorium, which is thus thrown into disturbed and irregular action, influencing the whole body; but to us it would appear that the aura epileptica is not an irritation of a nerve in the part from which it seems to arise, for then it would take the course of the nerve instead of passing along the integuments; but that it is a reflex sensation, caused by a morbid process going forwards in the brain, or a part of it—that it is a false perception—a mere symptom

portion of it; in another part it was red and inflamed.

“Several other morbid appearances are noticed. Excrescences on different parts of the basis of the cranium; caries of the bones; effusion on the internal surface of the dura mater, and on the arachnoid lining; variations of the convolutions of the brain, of its magnitude and colour; in the ventricles, corpora striata, thalami nervorum opticorum, tubercula quadrigemina. In fifteen of the dissections, the cerebrum and cerebellum were perfectly healthy.”

* Diction. des Sciences Médicales, Art. *Epilepsie*.

of an unexplained disorder of the sensorium, as much as tinnitus aurium, or muscæ volitantes, or numbness in a nerve, or pins and needles, as a certain pricking sensation is called by paralytic patients. It would be vain to investigate the essence of a disease, in which there is the utmost uncertainty even in the first stage of our inquiry; in which dissection, instead of affording assistance, rather perplexes us by the multiplicity and diversity of the changes of structure which it discloses. Moreover it would appear that so long as we are ignorant of the nature of the healthy function of the brain, in what manner its influence over the body arises and is maintained, the deviation from the healthy exercise of its function which constitutes the proximate cause of epilepsy must remain sub judice.

Predisponent cause.—According to systematic writers, the predisposition to epilepsy is supposed to depend on “great mobility,” on “a peculiar liability to excitement and collapse;” on “a liability to be influenced by those causes which are applied to most persons with little or no effect.” This condition connected with “a greater degree either of sensibility or irritability, it is conceived, is generally derived from original stamina, and may more particularly depend either upon debility or upon a plethoric state of the system.” We must, however, observe that we have known epileptics, who did not give way to strong emotions upon slight impressions, who were with difficulty excited, and who pursued every purpose with a manly constancy; and hence, without denying that a state, not easily definable, of mobility, is a predisposing cause of epilepsy, we conceive that it is by no means the only predisponent to that disease. An opinion on this subject which we hold, we think will probably not obtain favour; and yet, as it has not been hastily formed, we consider it a duty to put it forward, that it may be verified or disproved by future observers. We conceive that epilepsy is as certain a manifestation of the strumous diathesis as tubercular consumption, psoas abscess, hereditary insanity, or certain congenital malformations or defects of organization which are inherited only from scrofulous parents. Epileptic patients are of the habit of body in which scrofula occurs. We have no recollection of a case of cerebral epilepsy in a patient, who, when due inquiry was made, did not appear to inherit a strong disposition to scrofula. It must be admitted, however, that there are many epileptics in whom there exist none of the more common symptoms of scrofula.

That epilepsy is a hereditary disease is generally admitted. If, when consulted by an epileptic, we make diligent inquiry, we shall find that, although direct progenitors, father or mother, may have escaped, yet some member of the family (uncle or aunt, grandfather or grandmother,) has been subject to fits. As Boerhaave has observed, “silente sæpe morbo in genitore, dum ex avo derivatur in nepotem.” If epilepsy for the first time occurs in a family, it has appeared to us that it has been in conse-

quence of the strumous diathesis having been exalted by the intermarriage of two persons inheritors of that condition or tendency of the constitution, and which it has been in a yet more remarkable degree if the parents were of the same blood and nearly related—we may then expect, if an epileptic patient has several brothers and sisters, that his case will not be a solitary one in the family.

Occasional causes.—Patients, especially those who have had only two or three attacks of epilepsy, are ever ready to consider them as accidental. One attack is brought on by a fright, probably the most frequent exciting cause of the disease; another by over fatigue; one by confined bowels; another by a strong purgative; one by fasting, another by a surfeit; and it cannot be denied that very many attacks of epilepsy may naturally enough be traced to some inattention to the organs of assimilation, especially in the form of excess in the use of fermented liquors. There was lately in Steevens's Hospital, Dublin, a patient who some twelve or fifteen years ago had a fracture of the skull, which left a depression of the bone. After the accident occurred, he was subject to epilepsy whenever he indulged in the use of intoxicating liquors: at last he was induced to lay them aside, and ever since he has been without an attack of epilepsy, and is now an able-bodied watchman. "I have observed," says Fothergill, "that epileptics are often extremely incautious with respect to diet; that children highly indulged are liable to the disease; that in every other period of juvenescence, and in middle-aged adults, if they were attacked with the disease, it was when they had either committed some excesses, or by one means or another were plethoric; and that in habits subject to epilepsy, the disease seldom recurred without either an habitual indulgence in eating, or a neglect of necessary exercise."

The occasional causes of epilepsy may be divided into two classes. 1st. Joy, anger, suppressed discharges, repelled diseases, elevated temperature, bodily over-exertion, drunkenness, prolonged sleep, surfeiting, congestion of the bowels, obstructed or painful menstruation. 2. Opposed to these are terror, grief, disgust, exhaustion of mind from intense application to business or study, vigilance, inanition, hypercatharsis, venereal excesses, hemorrhage. "Parmi les causes excitantes de l'épilepsie la frayeur tient à-coup sur le premier rang. La colère et un chagrin profond, la masturbation, et les excès vénériens paraissent, après la frayeur, tenir le premier rang parmi les causes de l'épilepsie."* We read of epilepsy being caused by imitation. An attack of epilepsy, when witnessed by a number of unmarried females in a church or school, has often led to convulsions spreading from one to another, till a great many are affected. Dr. Whitt describes this affection in the following words: "There is a disease very common in the islands of Zet-

land, which is known there by the name of the convulsive fits. It begins with a violent palpitation of the heart; soon after which the patients fall to the ground, unless they are supported; their arms and legs are alternately contracted and relaxed; and in some cases their joints become so rigid that they cannot be bent. Their respiration seems to be difficult, and they cry terribly while the fit lasts, which is generally less than a quarter of an hour. This disorder seldom attacks married women; but young women, and even girls of ten or twelve years of age, are liable to it. Some boys and two young men in these islands have also been affected with it. In the church or other public meetings, as soon as one is seized, all such as have formerly been subject to the distemper are attacked with it, which often occasions great disturbance." These attacks, there cannot be a doubt, are not epileptic, but like certain more recent exhibitions in churches are clearly referable to sympathetic hysteria.

Of the occasional causes of epilepsy, it is justly observed by Dr. Cooke, that "some are stimulants producing an increased action of the brain, while others are sedatives, operating so as to diminish its energy." When there is a predisposition to epilepsy, a cause of either kind, productive either of excessive or defective action, may interrupt the equable transmission of the sensorial power by means of the nerves, and thus occasion a fit; and hence it would appear desirable to retain every patient who is subject to epilepsy in a state equally distant from plethora or from undue emptiness of the cerebral vessels.

Diagnosis.—We have reason to think that not only eclampsia, but hysteria; cataleptic hysteria; sympathetic hysteria, the disease of religious sects among whom enthusiasm is permitted to usurp the place of sobriety; catalepsy; cataleptis delirans; extasis, have been considered as specimens of epilepsy. The student, therefore, must acquaint himself with these diseases, as also with the history of feigned epilepsy, which, not merely in the military hospital but in private practice, he may be called upon to distinguish from the genuine disease. Let him bear in mind that if a fit commenced with a scream, if it was characterised by insensibility, convulsions, and foaming at the mouth, if it ended in sopor, and if the tongue were wounded or even gnawed at the edges, there can be but little doubt that it was epileptic.

Prognosis.—The prognosis in epilepsy embraces two heads of inquiry, viz. first, the danger to be apprehended from the paroxysm; and, secondly, the probability of a return.

As epilepsy sometimes proves suddenly fatal during a paroxysm, our opinion must be delivered with a salvo in reference to such a contingency. To form a judgment of the amount of danger, we must, first, endeavour to ascertain the species of epilepsy to which the case belongs; cerebral epilepsy being attended with more danger than nervous, nervous than gastric

* Diction. de Médecine, Art. *Epilepsie*.

or hepatic, and these again than uterine: but we must not forget that the sympathetic species of epilepsy may, by repetition, acquire the character of the idiopathic, and be attended with equal danger. Secondly, we may oftentimes judge of the danger of the attack by the symptoms which precede it; thus, in the cerebral species, danger may be apprehended when the preceding symptoms indicate a fixed disease of the brain, as intense pain, vigilance, delirium; when inroads have been made upon any of the mental faculties; and when there have been threatenings of paralysis. Thirdly, we are influenced by the violence and duration of the paroxysm. Those severe paroxysms which continue many hours often terminate in fatal exhaustion, or in an apoplectic state. Hence coma, after the convulsions, is truly alarming, as it shows that apoplexy has actually begun.

The probability of the return of the fits will, in like manner, be greatest in cerebral epilepsy, then in nervous, next in gastric and hepatic, and least in simple uterine. In cerebral epilepsy the fits will with most likelihood return in the cases in which the disease is inherited, in which the patient has a peculiarity in the configuration of his head and expression of his countenance, and which have been long established. Of the *epilepsia stomachica* and *hepatica*, the cases will probably be most obstinate which exist in connexion with habits of self-indulgence and with weakness of character. Of the *epilepsia nervosa* the stamina of the patient will in general decide our opinion both in respect of danger and repetition; indeed, in every species of epilepsy recurrence will be more probable in a constitution defective in point of original vigour, or impaired by excess. In the *epilepsia uterina* we have most hopes of ultimate recovery, inasmuch as epilepsy will frequently cease when a change takes place in the function of the uterus; as, for example, at the appearance or reappearance of the menses, at marriage or during pregnancy.

We are inclined to think that epilepsy will be found more inveterate when it occurs in patients who are affected with chronic cutaneous affections. To lepra, psoriasis, ichthyosis, and porrigo, epileptics are peculiarly liable.

Treatment.—In general, a physician now-a-days may unreservedly explain his views, to such patients as are possessed of good sense and temper, of the nature of their malady and the remedial process about to be employed,—nay, in some instances, may explain the doubts which are suggested by the former and the uncertainty of the latter, while at the same time the solid ground on which he builds his hope of achieving a cure is clearly pointed out. But such a procedure with nervous patients would be highly injudicious. Not only are such patients, by constitution, infirm of purpose, but by disease are they often rendered additionally irresolute, and, in consequence of the fears which disease engenders, they are a prey to every pragmatical relative or acquaintance or volunteer prescriber, who may choose

to insinuate doubts and apprehensions, suggest the necessity of changes, and damp and disconcert the medical attendant.

When he undertakes the treatment of a case of epilepsy, the physician ought in the first place to study the patient's disposition, in nervous illnesses it being generally of as much importance to distinguish the shades of character as the shades of disease; and, having penetrated into the interior of his patient's mind, he must there obtain an ascendancy not merely by knowledge of disease, but in virtue of that influence which is generally obtained by calmness of manner and consistency and decision of conduct. We venture to hazard an observation with respect to physicians of equal skill in the medical treatment of nervous diseases, that they who are not communicative will be more confided in and more successful than they who think aloud and explain all their views and plans.

It would lead us away from our subject, otherwise we could easily show the necessity that the physician is under of acquiring and retaining a complete control over the mind of his epileptic patients, and of inspiring them with hope. We may be permitted to state, in support of this observation, a fact which we have often witnessed, namely, the temporary advantage which is generally derived from a change of measures. When an epileptic patient is placed under the care of a confident empiric, or of a physician who is in great repute, the disease will often be suspended for a considerable time, and to the eye of a sanguine person appear cured; while on the other hand, after a long suspension, when the disease returns, such disappointment is produced as to fill the patient with the gloom of despair, a state of mind which would seem to renew the energy of those causes upon which the fits depend, and hence they occur at shorter intervals and with greater violence than ever.

The empiric, well knowing how much depends on confidence, has various methods of fixing unstable minds; he cajoles and blusters, and with equal power of fulfilment he promises and threatens; he knows that he may draw upon the imagination of his patient to any amount, and that his draft will be honoured; that the mystery with which he clothes all his measures is often the cause of his success, and hence he provides his own remedies, and invests them with supposititious activity. Give a patient a few grains of liquorice-powder, and let him be told that he has just swallowed part of the skull of a malefactor, (which once was considered a sovereign remedy for epilepsy,) or that this powder contains a substance of which, according to the German dreamer, a thousandth part of a grain is the proper dose, and you often may thus cure a disease which is anything but imaginary. In Ireland, epilepsy has often been cured by the priest, who is supposed by the credulous of his own communion to be gifted with the power of working miracles of healing, a power claimed for the Roman Catholic Church, even by her most enlightened mem-

bers. Uneducated adherents of the Church of England, and even the presbyterian, both in such matters equally credulous, often successfully apply to the same functionary to be cured of fits. He sometimes begins the curative process by giving two or three very powerful emetics; but he chiefly relies upon obtaining dominion over his patient's mind, an art in which he is often eminently skilled, and which he is the better able to practise, as probably he implicitly believes in his own supernatural power. If the epileptic be a Protestant, the priest signifies that the prayers which he offers up, the virtue with which he is endowed, are his, only for the benefit of the members of his own church; the patient, overpersuaded probably by his friends, goes to mass with reluctance, as a temporary expedient to qualify him for the intercession of his spiritual physician, by which means the latter gains an advantage over the disease. A struggle has taken place in the patient's mind, in which conscience is laid prostrate; a great and a permanent moral impression is made, which, especially if the disease is nervous epilepsy, sometimes ends in the fits being suspended, and the patient becoming a devoted adherent of the Church of Rome, to whose interests, by his belief in the superhuman power of her clergy exercised in his behalf, he becomes more attached than if he had been born within her pale; and confidence in the agency through which he has obtained relief, we doubt not, sometimes renders it permanent. Such is the nature of modern miracles, and such the principles by which even protestant clergymen have been enabled to take a part in a farce equally disgusting to all who are able to distinguish between true religion and superstition.

A successful empiric, who by various practices had for a long time sustained the hopes of a young lady who was afterwards under our care, one day observed her, while under a sense of faintness, having recourse to sal volatile; this he eagerly snatched from her, and throwing up the sash he violently dashed the vial upon the pavement, at the same time declaring, with well affected displeasure, that if he ever heard that she had any medicinal substance in her possession which was not given to her by himself, he would never see her again, as his remedies were so delicately combined, that, by admixture with any other drug, their efficacy would be completely destroyed.

When the extrinsic occasional causes of epilepsy are removed or guarded against, the paroxysm, as depending upon associations established within, will often return with equal violence. Against epilepsy thus become habitual and almost periodic, well sustained hope, whether rational or but a "fair fallacy," as were the amulets employed of old, will be found more efficacious than any other condition of the mind. Sudden alarm, indeed, has been called into assistance as an anti-epileptic remedy; but, with Dr. Cooke, we agree in thinking that terror cannot be employed in the treatment of epilepsy, as being a remedy not sufficiently under controul. From the annals of medicine

we learn that there were other influences formerly much in vogue, which, acting upon the mind alone, must have produced permanent feelings of disgust; as for example, the following medicines, which may be considered as a curious specimen of the articles of the *Materia Medica*, which, in former times, were derived from the animal kingdom:—*cineres talpæ, muris, corvorum; hepata ranorum; testicula et urina apri; dentes humani pulverisati; hepar hominis comestum; sanguis hominis recens occisi; sanguis patris; secundina humana; stercus humanum*: there are other abominations of the same kind, unnecessary to specify, the use of which, Erastus alleges, was taught to mankind by the devil; but without calling in question the active malignity of our great enemy, we are of opinion that man, when left to his own inventions, is fully equal to the discovery of these and a multitude of other therapeutic agents of equal ineptitude.

We have known regular physicians, aware of the advantage which may be derived from keeping the imagination under the agreeable excitement of hope, practise upon the credulity of their patients, as we conceive, very unworthily. We once possessed a prescription written by a physician of some name in Paris, in which the chief remedy prescribed by him was a polished piece of jasper or jade, which he ordered to be inserted under the skin of an epileptic patient's arm. Had he ordered the words of power which were supposed, by believers in the art magic, to be inscribed on the ring of Solomon, or any other talismanic characters of equal value, to be engraved on this anti-epileptic fossil, his charlatanism would have been more perfect. The regular physician must not practise deception even to forward the interests of benevolence, but he may practise reserve, which will often answer better than all the mystifications of the empiric. Let it be matter of agreement, when he undertakes the treatment of a case of epilepsy, that the patient shall not know the nature of the medicines to be prescribed. Were we, in certain cases, to send our prescriptions to the apothecary sealed up, the medicines so ordered would produce effects which would surprise even the prescriber himself.

It would be superfluous to dwell upon the importance of diet in the treatment of chronic diseases. In such diseases great improvement will sometimes arise from mere change of diet, how unobjectionable soever the diet may have been formerly. If, however, a change is recommended when the individual first comes under our care, it behoves us to explain the reason of the change; let us not, as some have done, change a patient's diet in such a manner as to abate his confidence in his former physician, who may have treated his case with judgment.*

* Some practitioners living in a thoroughfare, or in towns in which the population is constantly fluctuating, thinking that the character of their professional brethren at a distance is a matter in which they have no concern—thinking, moreover, that any means of advancement is lawful—ab-

It is needful to stipulate that our patient shall no longer yield to his appetite or inclination. He must move by fixed rules. He must eat only what is placed before him by order of his physician, not asking to have his food varied or enlarged. We do not exaggerate when we affirm that not one individual in ten, labouring under chronic illnesses, strictly observes the rule of diet which is appointed for him by his physician. Drunkenness, in the middle ranks of society, is much less prevalent than formerly, but epicurism in eating much more so. The affected delight with which some popular writers have expatiated on the refinements and indulgences of the table has been, we fear, supposed real, and has given a stimulus to sensuality much to be deplored, especially among young men, many of whom now put no restraint upon their appetite for rich and savoury food, while on the pleasures of the table they descant as shamelessly as if they were fit only for the society of Apicius. In general there is no difficulty in persuading patients to relinquish intoxicating liquors, which, as almost every sensualist is aware, seldom fail to produce painful exhaustion in proportion to pleasurable excitement, and which are well known to unfit those who habitually indulge in their use for animal gratifications which are more prized; but very great indeed is the difficulty which we encounter in securing a strict acquiescence in our injunctions with respect to food; and if this cannot be accomplished, it would be well that the physician at once should decline the care of an epileptic patient.

Having paid some attention to the proceedings of empirics, foreign and indigenous, regular and irregular, we venture to say that we may sometimes be taught by them useful lessons; and we ought not to decline assistance even from such sources: in this case the end will justify the means employed. There was some years ago, in Dublin, an outlandish person, said to be from Germany—a high German doctor, although by some it was alleged that he was a native of Ireland, and born in the *kingdom* of Kerry—who professed to cure epilepsy. His appearance was such as to strike a vulgar mind with awe, while one who had pleasure in the grotesque or fantastical, or a taste for the antique, could scarcely help being amused by the public exhibition of an individual who appar-

ently belonged to an earlier and more rude and credulous age of the world. With measured pace and serious aspect he paraded those parts of the city which are most frequented, displaying what the refined taste of our youth has rendered no longer a novelty—a beard like that of an adult goat; behind him, almost in lock-step, there marched a tall fellow in a gaudy livery—light blue, abundantly tricked out with silver lace. Jan Stein, the shrewd observer of water-doctors and mountebanks, never painted a more characteristic pair than the solemn leech, whom we have slightly sketched, and his self-important follower. At first, trade was brisk with this adventurer; but he soon left Ireland, having discovered, to borrow an illustration from the agriculturist, that ground made to yield too rich a crop is thereby soon impoverished; and probably he also found that in no community is there a keener perception of the ludicrous or a juster estimate of character than among the more respectable part of the inhabitants of Dublin. He held some of the opinions of the Nazarete, for he told his patients that they must not cut their hair, “in which,” he generally added, “lay the strength of the body,” and he inhibited the use of wine and all intoxicating liquors, a restriction not calculated to advance his reputation in Ireland. But to have introduced this original to the reader would be mere impertinence, were it not that there was a point in the regimen which he prescribed worthy of adoption. He ordered his patients to walk, those who were not enfeebled, twelve, fifteen, or even twenty miles a day. They were to begin by walking a moderate distance, and they were gradually to extend their walk according to their ability. In some of his patients a great improvement took place, both with respect to digestion and muscular strength, and this was so apparent in a short time, that ever since this luminary shone upon the metropolis of Ireland, most of our patients, affected with epilepsy, have, by our advice, been peripatetics. We recommend those who are subject to this disease to walk as far as they can without much fatigue. We do not prescribe one long walk, but several in the course of the day of moderate length. Delicate females have thus been trained to walk eight or ten miles, by making them sit or recline when they were fatigued, and again move on when rested. Females of the hysteric diathesis, who are liable to epilepsy, must pass as much of their time as possible *sub dio*, driving, boating, or even sitting in a sheltered place, if they are unable to walk without being fatigued, muscular exhaustion being generally hurtful to them.

In prescribing a rule of diet suitable to all epileptics, moderation in quantity and simplicity in the preparation of food are indispensable points. If the diet of an epileptic has been either too high or too low, it ought to be changed. We conceive the diet which would best preserve an individual, liable to scrofula, from an attack of that disease, would be best suited to a patient liable to epilepsy. Fer-

ruptly change the measures of their predecessor in attendance, as it would seem, to obtain confidence at his expense. If, for example, a dyspeptic patient has been permitted to take animal food only once a day, they will order it to be taken at every meal. Change of air, of occupation, a mild purgative regularly taken, and perhaps even for a limited time, a full diet after a restricted one, will often produce a sense of great improvement, which it is generally thought by the patient himself might have taken place earlier had his former physician been more skilful. The patient returns home full of erroneous opinions relative to diet, soon to experience an aggravated return of his sufferings, and fondly imagining that there is but one physician in the land who understands his case. Innumerable are the phases of quackery, inasmuch as it is applicable to every species of credulity and mode of folly.

mented liquors, however, should be in general altogether withheld. Flesh meat ought to form the principal part of one if not two meals in the day; and milk, if it agrees, that is, if it does not retard digestion, which it is less liable to do when fermented liquors are laid aside, is the article next in value. The epileptic ought to be trained so as to be in good wind, or, in other words, his muscles ought to be in a state of the utmost strength and firmness. If we permit ourselves to take a lesson from empirics, we may surely avail ourselves of such information as may be derived from a brotherhood at least as respectable, namely, the gentlemen of the *fancy*, as they are called, or we may have epileptics trained as were the *athletæ* in ancient times.

When the patient leaves his bed in the morning, he may have a rusk or a slice of toasted bread with an egg beat up in a teacupful of warm milk and water; then let him dress, make all needful arrangements, and walk three or four miles. Two hours or more after he has left his bed, let him have his second meal,—milk, or cream in water, or cocoa, with bread a day old and good butter. It may be observed that wheat flour is very generally adulterated with bean and potato flour, both of which injure the quality of bread, and that butter is much oftener rancid than good. Let the patient rest for three hours after breakfast, and this will be the best time to devote to business or education. Then he must again walk, if an adult possessed of sufficient vigour, from five to eight miles. At from five to six hours after his second meal let him have a third, consisting of meat-of the best quality,—mutton excluding fat, poultry, game, or very tender beef, roasted or boiled, of which an adult must not eat more than six ounces; bread, and one moderate helping of tender well-boiled vegetables; of drink—not more than a common tumblerful must be taken, distilled water, Seltzer water with a little milk, or toast and water, being equally proper. Then the individual may rest for two hours, but we would not have him lie after meals as some have recommended, this having appeared to us to retard rather than to promote digestion, probably by disturbing the circulation: he may stroll in a garden, read an amusing book, or chat with an agreeable friend, only such occupation being permitted as will not raise the pulse by one beat; he may then resume more active exercise for an hour or two. In five or six hours after dinner a light supper may be taken, consisting of not more than four ounces of meat with bread, or of a cup of milk with a water biscuit. The rest of the evening may be spent in cheerful society, in a large airy room, not overlighted nor overheated, but sufficiently warm to prevent that chill which in the latter part of the day often follows very active exercise; and every occupation by which the mind is depressed, or is excited and thereby subsequently exhausted, must be avoided. The patient must be in bed at eleven and up at six, nothing in general being more hurtful to epileptics than sleep unnecessarily prolonged.

The scalp in all epileptics ought to be shaved once a week, (a few ringlets at the temples and in front being permitted to grow,) and daily well rubbed with a flesh-brush after the tepid shower-bath, or what answers nearly as well and gives less trouble, after pouring a flaggon of tepid water on the head inclined over a large basin. The hat or cap worn must be of the lightest kind, a straw hat, or a light foraging-cap of cloth, which may be replaced, when within doors, by a night-cap of woven silk worn single. The patient may gradually bring himself to sleep without a night-cap, and without curtains, both of which lead to effeminacy; with his shoulders and head raised and his feet well protected from the cold, in a chamber as large and airy as possible, and without a fire; there may, however, in winter, be a fire in his dressing-room, or his bed may be warmed. The temperature of his extremities must always be supported by means of exercise, friction, or proper clothing.

A patient liable to epilepsy must not be permitted to ride or to hold the reins in a carriage. The grates in all the apartments which he frequents ought to be guarded by a deep and strong fender; he ought to avoid the streets of a crowded city, in which the whirl of carriages, the tide of human beings, the stunning confusion of sounds, and the multiplicity and distraction of objects, produce a vertiginous hurry of thought, which to him is ever dangerous. He ought not to walk near water. One of our earliest patients, a fine young man of twenty, came to an untimely end, in his own garden, by falling into a runnel, in which he was drowned, although the water was not more than four inches deep. Lastly, if his circumstances admit of his having an attendant, the epileptic ought never to be alone. His companion ought to be provided with a nervous draught, consisting of camphor mixture and ether or ammonia, by taking which there is reason to think that the paroxysm may be averted in the gastric or nervous species of epilepsy; with a wedge of soft wood to interpose between the teeth; with a piece of broad tape to be applied to the superior part of the limb, if the paroxysm should commence with the aura in the extremities; and with an air-pillow to inflate, and place under the patient's head, when he is attacked in the open air. If the attack takes place in his chamber, the patient ought to be laid on his back on a French bed, with at least one attendant standing on either side to prevent him from injury during the struggle. If he is much flushed, his head and shoulders ought to be elevated, the warmth of his extremities supported, while at the same time air is freely admitted into the room. All attempts to make him swallow, or to stimulate the nostrils, are improper. A medical practitioner ought to be sent for and ought to remain in attendance while the struggle lasts. In a first attack, if the fit is severe, blood ought to be procured from the temporal artery, a precaution which will also be necessary in patients of an apo-

plectic diathesis, whensoever they labour under a prolonged fit of epilepsy.

Most of the foregoing observations apply to every case of epilepsy. Having endeavoured to determine the variety to which the case belongs, a point in general overlooked by the nostrum-mongers, we have now to point out the specific treatment which will be required. We are in the first place to ascertain whether there exist any symptoms of present danger; and, secondly, to apply ourselves "to the more continued treatment required in the disease considered as a chronic affection."^{*}

Epilepsia cerebialis.—If the case belong to cerebral epilepsy, we must endeavour to discover the condition of the vessels with respect to increased action or congestion; if in a state of excitement or turgescence, they must be relieved without delay, by means of general or local bleeding, or by antimonials, with mercurial purgatives, and the antiphlogistic regimen. After every paroxysm, as soon as the patient awakes from that sleep which is part of the crisis, he ought to be examined with care by a medical practitioner. We conceive, were this uniformly done, and the necessary treatment immediately adopted, that in many instances the subsequent attack would be milder and more distant, the faculties of the mind would be less endangered, and the probability of ultimate recovery would be greater. Many chronic affections are merely a series of imperfect recoveries from attacks of acute diseases. This we have seen exemplified on a large scale in the House of Industry in Dublin, which in former times was filled with paupers, the victims of poverty and intemperance, mostly labouring under chronic disorders of the viscera. Many of these outcasts from society passed much of their time in the subsidiary hospitals, to which they were sent when they were affected with febrile attacks, of which a considerable portion of them died; each recurrence of fever assuming a darker complexion in consequence of recovery from its precursor being incomplete. In epilepsy, if due attention were paid after every return of the convulsions to establish the fact of perfect recovery, we are persuaded that the patient might often preserve his place in society, instead of becoming from chronic disease of the brain, originating in or aggravated by the severe paroxysms, a mere driveller, as is the lot of many an epileptic in the latter part of his life. And this view is strengthened by the fact, that some patients are reduced to idiotism, not so much by the natural course of disease, as by vicious habits in which they indulge, which not only confirm the predisposition to epilepsy, but injure the brain and nervous system: "L'abus des liqueurs alcooliques, les excès veneriens, et la masturbation aggravent l'épilepsie et précipitent la perte de la raison."[†]

The paroxysms of *epilepsia cerebialis* chiefly occur, to use an expression of Fothergill's, "in the plenitude of health;" and when this

is the case, we may pursue the plan about to be recommended with more confidence.

In treating this form of epilepsy we apply the principle of revulsion, explaining that term, not as the driving back of the fluids from one part to determine them to another, but simply as expressive of the relief to be obtained for an organ in which a morbid process is going forward, by inducing a more vigorous state of the circulation in other organs, or by the establishment of a process of counter-action in a remote sympathizing part. With this view we have to recommend, first, once a month the cupping-glasses and scarificator to be applied to the nucha, and a few ounces of blood to be by that means taken away; secondly, dry-cupping to be practiced between or over the scapula every third or fourth day, two cupping-glasses to be allowed to adhere for a quarter of an hour; thirdly, a caustic issue (which is less troublesome and painful in dressing than a seton) to be made in the back of the neck where the seton is usually inserted; and, lastly, once in the week, a moxa, or a blister, not larger than a crown-piece, to be applied to the back of the head, behind the upper part of the ear, where there is space for a succession of four such blisters. If a blister be preferred to a moxa, let it be put on at noon, and it will be ready to be dressed before bed-time, by which means the patient's rest will not be broken, as it generally is, by a blister, however small, applied at bed-time. There is abundant evidence of epilepsy being moderated while a discharge has been maintained, from a sore either accidentally occurring or designedly produced, and being aggravated almost immediately after such discharge has been dried up.

In *epilepsia cerebialis* we wish to promote a more active circulation in the muscular tissue, and in the integuments, especially of the limbs, which is to be done by champoning and frictions, while the head is kept cool and the shower-bath taken daily. Our hope of cure in this form of epilepsy chiefly rests on persevering attention being paid to diet and regimen, and on topical means; yet although our confidence in the use of internal medicines is not so great in this as in the other species of the disease, they are not to be dispensed with, when the functions of the cutaneous, gastro-hepatic, or nervous systems are disordered.

Antimonials are requisite when the skin is inactive, and we have known signal benefit afforded by antimony to those persons who, in advanced life, have laboured under the apoplectic epilepsy, as it has been called. The preparation of antimony which we prefer is James's powder, the pulvis Jacobi veri, and the following is the method of exhibiting it which we recommended a good many years ago,^{*} and which has often been adopted since with advantage. The patient is to begin with a very moderate dose of the powder, not more than two or three grains at bed-time, and to increase the dose by half a grain every night,

^{*} Prichard. [†] Georget, l. c.

^{*} Dublin Hospital Reports, vol. i. p. 315.

till some sensible effect is produced on the skin, stomach, or bowels. Should the stomach at any time be affected with sickness, the dose may be lessened by a grain on the following night. By the addition of a few grains of rhubarb, a larger quantity of James's powder may be administered than the stomach could otherwise bear. If the skin be affected, the dose should not further be increased, but it must be repeated every night for about three weeks; it may then be reduced as it was augmented by half a grain every night, the course occupying a period of at least six weeks. We have known eighteen or twenty grains taken every night for a considerable time without inconvenience, and even when not productive of any sensible perspiration, it has often allayed the heat and restlessness which so often accompany irregular determinations of blood. In very cold weather we have directed the patient to make some addition in point of clothing, but have not confined him to the house even when the snow was on the ground; as we do not consider the system to be more susceptible of catarrhal or rheumatic affections while under the influence of James's powder. To this course of medicine the tepid bath will prove a valuable addition.

If there be any of those scaly affections of the skin to which epileptics are so liable, a draught as follows may be taken:

R Radicis sarsaparillæ concisæ, ʒi.

Radicis glycyrrhizæ concisæ, ʒiii.

Aquæ calcis, uncias x.

Macula in vase clauso, subinde agitans, per horas duodecim, dein cola. Divide in haustus sex. Sumat unum ter quotidie.

When the eruption is not attended with inflammatory heat or itching, the aqua picis liquidæ may be given to the extent of from half a pint to a pint in the day, or as a substitute the pilulæ picisæ.

In indigestion with a loaded tongue, the nitro-muriatic acid may be deserving of a trial, two or three minims of the nitric acid, with four or five of the muriatic, in three ounces of distilled water, may be sucked up through a glass tube or a reed, at least three times a day. Where the breath is heavy, the following powder may be given.

R Pulveris recentis carbonis ligni, gr. xv.

Pulveris rhei, gr. ii.

Pulveris ipecacuanhæ, gr. i. M.

F. pulvis e cyatho vin. aquæ cinnam. bis quotidie sumendus.

If the urine be scanty, with a red sediment, a drachm of Brandish's alkaline solution in water, or an alkaline bitter draught, may be taken every forenoon and evening. We do not object to the occasional use of mercury, but we have never, in this form of epilepsy, willingly given that mineral so as to affect the mouth. If the bowels are confined, one of the following pills may be given at bed-time:

R Extracti aloes,

G. galbani, sing. gr. ii.

Saponis duri, gr. i. M.

Or the following powder, which was the fa-

vourite aperient of a Dutch empiric, who undertook the cure of epilepsy:

R Sulphuris loti, ʒi.

Sulphatis potassæ, gr. x.

Pulveris rhei, gr. v.

Pulv. nucis moschatæ, gr. ii. M.

Lastly, if the nervous system be irritable, the patient desponding and apprehensive, the treatment to be recommended under the head of Epilepsia Nervosa will probably afford relief.

Epilepsia stomachica.—We once had a patient who, in the early part of his life, had been under the care of the celebrated Dr. Cullen. Dr. Cullen kept him in a state of unceasing nausea for a very long time, our impression is for more than a year, and without the slightest relief. It is not so that we would have emetics employed. We conceive that attacks of epilepsy may sometimes be parried by giving emetics at stated periods, and we have been accustomed to prescribe the following emetic in this form of epilepsy, once in the week:

R Pulv. ipecacuanhæ, gr. xv.

Sulph. zinci, gr. v. M.

Two cases of the epilepsia stomachica were successfully treated by giving once a week a calomel bolus at bed-time, and on the following morning a draught containing castor oil and oil of turpentine in the following doses:

R Olei ricini, ʒiii.

Olei terebinthinæ, ʒii.

Mucilaginis acaciæ, ʒiii.

Aquæ menthæ viridis, ʒvi. M.

To the best of our recollection, both patients had a pill of aloes and soap every second day, took bitter medicines, and had their diet regulated with great care, more especially with regard to quantity.

In this form of epilepsy, the bowels ought to be completely emptied, every second day, by means of a dinner pill, and the use of the injection syringe.* The dinner pill may consist of two, three, or four grains of the pilulæ aloes compositæ, or the pilulæ aloes cum myrrha, or of the pilulæ stomachicæ Mesues, now, by an altered name, contributing to the medical fame of Lady Webster, and which owes its efficacy solely to the aloes which it contains, and

* When the bowels refuse to act regularly without the assistance of medicine, which is the case with many persons advancing in life, it is an error to order a purgative every day; the evacuation procured by medicine is generally so complete that a longer time elapses before the bowels fill than after a natural stool, therefore the purgatives resorted to, whether aloetic pill in the evening, or a saline aperient before breakfast, ought to be taken only on each alternate day. Their contents ought to be permitted sufficiently to accumulate before the bowels are again urged to discharge themselves of their load; by this means the cathartic being more completely incorporated with the fecal residuum, irritation and mucous stools will be avoided. If a purgative be taken when the bowels are comparatively empty, more frequent discharges will be obtained, but they will be less consistent and satisfactory; and griping and tenesmus, and perhaps hemorrhoidal irritation, will be the consequence.

to its diffusion among a mass of solid aliment. A pilula ante cibum ought not to contain more than a grain and a half or two grains of aloes, or to be taken every day. The injection may consist of a pint or more of tepid or cold water, with or without two or three drachms of the muriate of soda.

Once every week the bowels ought to be fully evacuated by giving at bed-time a medicine acting upon the liver, stomach, and small and great intestines:

R Hydrarg. submuriatis, gr. ii.
Pulv. ipecacuanhæ, gr. i.
Pulv. rhei, gr. iv.
Extr. aloes, gr. ii. M.

F. pilulæ ii. hora somni sumendæ;
and the following morning before breakfast, a saline aperient draught.

At the same time the patient must have a tonic medicine, twice in the day, containing half an ounce or six drachms of the atramentum Heberdenii, now introduced into the Dublin Pharmacopeia under the designation of *mistura ferri aromatica*, or an ounce of the *mistura ferri composita*, or the following draught:

R Sulph. ferri gr. iii.
Sulph. quininae, gr. i.
Infusi calumbæ, ℥i.
Ac. sulph. dil. m. iii. M.

It is in this species of epilepsy and in nervous epilepsy, that benefit may occasionally be obtained from the *nitras argenti* and *cuprum ammoniatum*. In the cerebral species we have repeatedly tried the former medicine, in the dose of nine or ten grains a day, for a sufficient length of time, without the slightest benefit.

Among the means most likely to improve the state of the digestive system, there is not any which is so uniformly beneficial as change of residence and travelling, and the improvement is often felt for many weeks after a movement. Journeys, in the case of the epileptic, who naturally dislikes to expose his infirmity to strangers, ought to be undertaken shortly after an attack, as a considerable period of time generally elapses before the fit may be expected to return. It would appear from the following observation, made by De Haen, that changes of residence and long journeys have sometimes cured the disease. "*Etiam mutatione domicilii, diuturniore peregrinatione, vitæ genere prorsum permutato, quidam leguntur se etiam ab ipsa gentilitia labe præstitisse immunes.*"

Epilepsy has sometimes arisen from tænia. When this takes place, the treatment will not be attended with much difficulty, as the disease may be removed either by means of rectified oil of turpentine, or by tin in powder given in large doses, and followed by cathartics. We have found in some individuals, that after worms, especially ascarides, have been expelled, so that there was no vestige of them for several weeks, they have reappeared within two months, as if a nidus had been left behind. In such patients, worms may be

permanently destroyed by exhibiting proper anthelmintics before the expected period of recurrence, which may easily be ascertained.

Epilepsia hepatica.—When hepatalgia, biliary colic, icterus, or any other symptom of biliary congestion, precedes or follows an attack of epilepsy, local bleeding, an issue over the region of the liver, and mercurial purgatives will be requisite, and afterwards alternate courses of dilute nitro-muriatic acid and of taraxacum, the latter exhibited as follows:

R Extracti taraxaci, ℥ii.
Extracti gentianæ, gr. x.

Olei cinnam. min. ii. M. et divide in pilulas xii æquales. Sumat tres ter quotidie superbib. haustum decocti taraxaci.

R Taraxaci, ℥ii.
Extr. glycyrrhizæ, ℥ii.

Quæ ferventis quod satis sit ut colentur uncia decem. Coque per horæ tertiam partem et cola. Colaturæ adde supertratis potassæ, ℥i℥. Divide in haustus sex.

Epilepsia nervosa.—The chief indication in this species of epilepsy, after the removal of the exciting cause, is to allay the irritability of the stomach and to strengthen the system. The stomach is ever disturbed, the disturbance evincing itself not in anorexia but in despondency, in irritability of mind, in the *animus*, *nec sponte, varius et mutabilis*, in depression of strength, unrefreshing sleep, and often in that most distressing sensation which has been called "the fidgets;" in palpitation, in acute pain in the mamma, and in the existence of various other symptoms of hysteria. In neither males nor females, is this variety of epilepsy connected with the state of the generative system, unless when the attacks proceed *ex onanism*.

In nervous epilepsy our chief reliance is upon diet, regimen, attention to the state of the bowels, proper regulation of the mind; and on such medicines as valerian, camphor, snake root, and castor. The following draught we have often known to relieve the irritable state of the nerves which attends this species of epilepsy.

R Radicis valerianæ,
Radicis serpentariæ, aa. ℥ii.

Aquæ ferventis, ℥vii. digere per horam, et liquorem frige factum cola. Colaturæ adde

Sp. ammoniæ aromatici, ℥ii.

Tincturæ serpentariæ, ℥vi. M. et divide in haustus sex. Sumat unum meridie et vespere.

Tonics are also applicable to this affection, as cinchona and iron, especially the former when epilepsy is periodic. We have known moderate doses of nitrate of silver given with advantage in aggravated hysteria, and hence, although we have not successfully prescribed it in nervous epilepsy, unless in one instance, there are many cases of this variety of the disease in which it would probably be of great use. Much may be expected from agreeable occupation, variety of scenery, the bracing air

of the sea, and tepid and cold sea-bathing. All kinds of fermented liquor, tea, and also coffee, ought to be given up, together with the use of tobacco, if unhappily the patient should have addicted himself to the use of that poisonous and demoralizing weed.*

Epilepsia uterina.—If the attacks of epilepsy precede the menstrual period or accompany it, the effort of the constitution being imperfect, relief must be sought for in venesection, purgatives, and the antiphlogistic regimen. In the interval between the periods, those emmenagogues must be employed which moderately act upon the intestines, and at the same time give vigour to the circulation; as, for example, pills of myrrh, sulphate of iron, and aloes; or pretty full doses, two or three times in the day, of the carbonate of iron, with a moderate dose, every second night, of the decoctum aloes compositum. The tepid pediluvium, or hip-bath, with friction of the back and limbs at bed-time, more especially just before the menstrual period, may be practised; and in this species of epilepsy also the patient ought to have the benefit of sea-bathing, and frequent changes of residence.

There is a point from which our attention ought never to be withdrawn in the treatment of epilepsy, namely, the exciting cause of the first paroxysm. If the paroxysm have been caused by mental impressions, not only ought the causes of fear, anxiety, and displeasure, to be in as much as possible removed, but endeavours ought to be used to strengthen the mind. If from excess of any kind, then every method of renovation must be employed. If from inanition, proper restoratives must steadily be exhibited. If the disease be periodic and connected with dysmenorrhœa, after evacuations, if they are indicated, anodynes, even in large doses, will be necessary; of which the following will be found one of the most efficacious:

* Tobacco is an enemy to domestic economy and personal cleanliness; it taints the breath permanently, injures the digestion, impairs the intellect, and it even shortens the life of some of its votaries. Cullen says it produces loss of memory before the usual period. Snuff keeps a great many of the females, engaged in lace-making, in this neighbourhood (Newport Pagnell), under the continued influence of hysteria, and gives them an early stamp of age; at thirty a snuff-taker looks as if she were forty years old. It is the sole cause of a variety of dyspepsia, of which we have witnessed a vast number of instances—the symptoms being a painful sensation of a lump at the stomach—of a hard undigested substance pressing, as it were, upon a tender part of the stomach, which sensation is, for the time, relieved by taking food; remarkable depression of spirits, every thing seen through a medium of gloom and distrust; and tremors of the nerves. “Upon an accidental interruption of snuff-taking for a few days the pains do not occur, upon a return to snuff the pains return.”—(*Cullen's Mat. Med.* vol. ii. p. 275.) Chewing tobacco will produce the same affection. Smoking produces anorexia and emaciation. The chief evil, however, in tobacco, taken in any way, is that it leads myriads upon myriads to the habitual use of ardent spirits and opium, and consequently to the ruin of soul, body, and estate.

R Camphoræ, (ope sp. vini rect. in pulv. red.) 3℥.

Extracti hyoscyami, gr. xv.

Extracti opii, gr. iii. M. et divide in pil. xii. æquales.

Of these compound camphor pills two may be taken on the very first accession of pain, two in an hour after, and even a third dose may be taken after a second hour; if relief is not obtained, sometimes a double or even quadruple portion of opium must be given; it being an established point of practice that the pain which attends dysmenorrhœa is to be subdued without loss of time. We apprehend that the efficacy of full doses of camphor on painful menstruation is not so generally known as is desirable.

To propose a regimen of diet, which would apply to every variety of epilepsy, as we have already hinted, would lead to a disproportionate extension of this article. The directions, therefore, which we have given, are of necessity general, and may be departed from should the paroxysms return with unabated frequency. Eminent physicians, as for example Dr. Fothergill, have recommended abstinence from all kinds of animal food and fermented liquors. He tells us that, “In the form of epilepsy, which may be supposed to proceed from disorder of the digestive organs, evidenced in craving appetite, and supported by inattention to diet, laxatives, with a light chalybeate interposed and steadily continued, together with a course of diet consisting of milk, vegetables, fruits, and things prepared from them, and in moderate quantities, seldom fail of removing the disorder.”

In Heberden's Commentaries, we have the following pithy illustration of the importance of diet: “Duo epileptici ab omni cibo animali abstinerunt, et sanati sunt.” And Dr. Abercrombie, no mean authority in this or in any practical point, is of opinion that the only remedies of real efficacy in such cases are purgatives, a strictly vegetable diet, and total abstinence from strong liquors. According to our experience it would not be easy to overrate the importance of diet in epilepsy, at the same time we admit that many changes may be necessary before the full advantage is obtained which diet is capable of yielding;—one rule alone, in our opinion, being established, namely, that food ought ever to be taken in great moderation; in other words, that there is danger in a full meal, however unexceptionable the materials may be of which it consists.

When, in medical works of respectability, we meet with a variety of remedies, many of them possessed of dissimilar qualities, recommended for the cure of the same disease, we must conclude that its species are dissimilar in their nature and require to be treated differently. In examining the anti-epileptic remedies recommended by authors, we may discover four classes, viz. evacuants, tonics, nervines, and emmenagogues: first, those which reduce vascular congestion or action, venæsectio, hirudines, fonticuli, setacea, cauterium,

vesicatoria, irritantia, emetica, purgantia, antimonium, mercurius: secondly, those which invigorate the body and improve the digestion—*aëris et dietæ mutatio, balneum frigidum, cinchona, amara, acida, zincum, argenti nitras, cuprum*: thirdly, medicines which relieve disorders of the nerves—*serpentaria, cardamomum, valeriana, castoreum, moschus, camphora, guaiacum, hyoscyamus, belladonna, stramonium, opium*: fourthly, emmenagogues—*ammonia, galbanum, assaefetida, aloes, ferrum, oleum terebinthinæ, ruta*. A consideration of the foregoing catalogue would justify the division of the subject which in this article has been adopted.

If the necessity of more diligently studying epilepsy, of more carefully attending to its specific differences; if the inapplicability to some cases of epilepsy of the treatment which has succeeded in others, be admitted and acted upon, happier practical results will probably be the consequence. But, lest the reader should suppose that we are too sanguine in this our expectation, he shall have the concurrent testimony of the venerable commentator on Boerhaave produced, to whose authority he will more readily yield: "*Illis observationibus sic collectis et in ordinem digestis, sedulo expendat medicus omnia, et facile detegat regulas agendorum et vitandorum, sed in singulari tantum hujus ægri casu. Nam generales in omnibus epilepticis curandis regulæ haberi nequeunt; quod enim uni prodest, sæpe nocet alteri. Ubi hoc factum, tota difficultas evanuit, nam reliquum est tantum facilis executio bene persensarum rerum. Certum est, medicos, luculenta praxi obrutos, sæpe deficere in cura hujus morbi, cum tempus ipsis non sufficiat, ut singulari ægro tantam curam impendant; verum et doluerunt toties, ægrorum custodes observasse illa, quæ ipsi neglexerant, non sine famæ damno. Credo firmissime, si omnem animi attentionem adhiberent hic medici, quod sanarent plures epilepticos, et levamen adferrent fere omnibus.*"—Sect. 1080.

(*J. Cheyne.*)

EPISTAXIS, (derived from *ἐπι* and *στάξις*, *stillatio*, from *στάζω*, *stillo*), a flow of blood from the nose. This is one of the subdivisions of the natural class of disorders termed hemorrhages, to which article in this work (in order to avoid unnecessary repetition) we refer for a general explanation of the circumstances under which it takes place.

Bleeding from the nose is a physical phenomenon too common and conspicuous to have escaped notice at any period; and from the earliest times its consequences, together with the conditions of the body which have accompanied and preceded it, have been objects of medical observation. The word *epistaxis* has, also, from a very early period, been applied to this affection under whatever circumstances existing; but it is evident that Hippocrates, who has left us several observations on the subject, used its original always to signify an *oozing*, and *αἱμορραγία*, a *rush of blood*: we make, however, no such distinctions.

Of the various hemorrhages, *epistaxis* is the most common; and so often is it attended with salutary effects, that its encouragement and suppression equally require the consideration of the medical practitioner. Its frequency is readily accounted for when we reflect on the structure of the Schneiderian membrane; its extreme tenuity, and the number as well as proportionate size of the ramifications of bloodvessels which traverse it in every direction, forming a complete net-work, with a comparatively smaller portion of interstitial cellular substance and thinner laminæ of membrane enveloping it than is to be found in any other part of the body. The bloodvessels of this membrane being for the most part supplied by the internal maxillary artery, and inosculating with some of the extreme ramifications of the internal carotid, any increased impetus given to the latter, or to the trunk of the former, is less resisted in this part; and, in consequence of the rupture which is very frequently occasioned, an escape of blood is effected, with relief of both these systems of vessels, and, in a very essential manner, to the advantage of the brain.

As in hemorrhages from every other part, it is important to observe that in *epistaxis* there are two opposite conditions of the bloodvessels, induced by corresponding states of the body under which it occurs: in the one the extreme vessels are ruptured by the increased activity of the circulatory system, general and local; in the other, from debility and relaxation their elasticity is destroyed, and, incapable of distention as well as of propelling their contents, their parietes readily give way; or, from the same condition, red blood insinuates itself through the exhalents, instead of the thinner and colourless part of this fluid proper to them. We shall proceed to consider *epistaxis* under these two conditions, adopting the common language of pathologists in applying to the former the term *active* or *entonic*, and to the latter *passive* or *atonic epistaxis*.

Entonic epistaxis occurs occasionally in very young children, most frequently before or about the age of puberty, and in persons of a plethoric or sanguine temperament; the latter are not unfrequently the objects of it until the advances of age effect a change on the constitution, and the balance of power is transferred from the arterial to the venous system. Thus we find in early life that this hemorrhage is almost always from the arteries, and in old persons, when it does occur, that the blood flows from the venous system. The habits and exercises of males render them more liable to *epistaxis* than females; but on the other hand we find in the latter that it is very often vicarious with the suppression of the menstrual discharge, and occasionally occurs with the same periodical exactness. Even in the male sex the influence of habit is often evinced in the occurrence of *epistaxis*, and, after other causes have been removed, it is sometimes with difficulty that its power is resisted.

Local injury, inordinate exercise, exposure to heat, or increased temperature of the atmosphere; hot drinks, stimulating diet, sup-

pressed discharges, either natural or artificial; and all other circumstances which increase the quantity of blood, or the impetus by which it is distributed to the different parts of the head, may occasion the occurrence of epistaxis.

In addition to these causes, it has been frequently preceded by various emotions of mind, terror, anger, and even a single excitement of the imagination; hence, says Mason Good, we may readily trace by what means the philosophers and poets of the eastern world, and even some of those of the western, were led to regard the nose as the seat of mental irritation, the peculiar organ of heat, wrath, and anger; and discover how the same term *אף* (*ap* or *aph*) came to be employed among the Hebrews to signify both the organ and its effect, the nose, and the passion of anger to which it was supposed to give rise.

In some individuals it is probable that there is an extraordinary delicacy of the Schneiderian membrane and its vessels, which renders the latter peculiarly easy of laceration: there appears also to be a degree of correspondence between this expansion and the integuments of the face with which it is continuous, the phenomenon of blushing being often remarkable in persons subject to epistaxis, a circumstance which is doubtless also in great part to be referred to the identity of temperament predisposing to both of these affections.

Excitation of the olfactory nerves, in persons of peculiar irritability of the organ of smell, has occasionally induced epistaxis; an example of this kind has been recorded by Bruyerin, in which it was induced by smelling an apple; and another by Rhodius, in which the odour of a rose appeared to be the exciting cause. Coughing, sneezing, singing, and reading aloud for any length of time, stooping also, and particular postures of the body, have not unfrequently occasioned it. The secretory office of the Schneiderian membrane is liable to material interruptions from the vicissitudes of temperature to which it is necessarily exposed in the act of respiration; and any check by cold to its natural or inordinate secretion will occasionally lead to the rupture of bloodvessels in this part.

The febrile disorders which are attended with determination of blood to the head are often the precursors of epistaxis; and this affection, from the days of Hippocrates, who pronounced it critical, an expression which has been adopted through succeeding ages to the present day, has been welcomed as a salutary effort of nature, either to relieve or bring the disorder to a favourable issue. Some nice distinctions have been drawn, by the great authority just mentioned, of the different indications from the occurrence of epistaxis on different days of the progress of fever; but independently of their being inapplicable to the fevers of this country, more extended experience has shewn that this is to be regarded as only one of an assemblage of symptoms from which our judgment of the issue of such diseases can reasonably be drawn.

Epistaxis has sometimes been observed to

be synchronous with the periodical returns of intermittents, taking place at the accession of the hot stage, when in this, as in other disorders in which fulness of blood in the vessels of the brain has been one of the morbid conditions, the greatest danger of injury to that organ, and its consequences, has been averted by the escape of blood from the nose.

In congestions of blood in other organs of the body, whether of an acute or chronic character, as in the lungs, but particularly in the liver; or in mechanical obstructions to the free course of blood, occasioning its determination to the head, or an impediment to its free circulation in this organ, the same effect has been attended with the same salutary consequences. The suppression of the natural secretions of the body is a frequent cause of epistaxis. We see it occurring very commonly in amenorrhœa; in those diseases in which the secretions of the other mucous or serous membranes are suspended; and not unfrequently when the natural function of the skin has been checked partially or generally. Morgagni has handed down to us the record of an extraordinary, and, as far as we know, a singular instance of the simultaneous occurrence of epistaxis in a number of persons:—it is stated that in the year 1200 there was a great mortality of men in the space of twenty-four hours, in Tuscany and Roman-diola, by a flux of blood from the nostrils; and Morgagni has remarked that Clementini, the historian of Rimini, had noted that in the same year a great number of deaths from hemorrhage had occurred within four-and-twenty hours at Rimini, Ravenna, and in other cities of the Roman province; but from what part of the body is not mentioned. Various conditions of the atmosphere, it is well known, have a powerful effect on the expansive quality of the blood, as well as of other fluids: besides the effect of the stimulus of heat, the *plethora ad molem* is induced by the same cause; it not unfrequently happens that passing from a cold into a heated room occasions this kind of hemorrhage; and a sudden transition in the natural atmosphere occasioned, it is probable, the endemic we have just noticed. The same expansive quality of the blood is evinced by alterations of the atmospheric pressure; and in the ascent of high mountains an early physical consequence has been a flow of blood from the nose, increasing in proportion to the altitude, and succeeded by hemorrhage from the ears and lungs, as well as by other very alarming symptoms. We have an interesting example of this in the enterprising traveller Saussure, on the occasion of his celebrated ascent of Mont Blanc.

The passive or atonic epistaxis takes place only in those extreme states of depression of the vital powers which occasionally occur after the inflammatory stages of fever have passed by, or in such as have been considered of a putrescent tendency, as in the advanced state of eruptive fevers, particularly of malignant small-pox and scarlatina. In cachectic diseases, such as the purpura hemorrhagica, scorbutus, and cer-

tain broken-down states of the constitution, consequent to visceral disease of a chronic kind, particularly that of the liver arising from the long-continued influence of a hot climate, or the habitual intemperate use of spirituous liquors, the atonic epistaxis is occasionally a very troublesome and dangerous symptom.

Instances have been recorded of the loss of almost incredible quantities of blood from the vessels of the nose. Ten, twelve, and upwards of twenty pounds have been known to flow away before the hemorrhage has ceased. "Bartholin mentions a case of forty-eight pounds, Rhodius another of eighteen pounds lost within thirty-six hours; and a respectable writer in the *Leipsic Acta Erudita*, a third, of not less than seventy-five pounds within ten days, which is most probably nearly three times as much as the patient possessed in his entire body at the time the hemorrhage commenced." In the *Ephem. Nat. Curios.* is a case "in which the quantity indeed is not given, probably from the difficulty of taking an account of it, but which continued without cessation for six weeks."*

The active or entonic epistaxis is usually preceded by a sense of weight and fulness in the forehead and face, frequent flushing in the latter, with heat and itching in the nose; a remarkable degree of throbbing is often experienced in the temporal arteries, a ringing in the ears, and sometimes a dull or indistinct sense of hearing; but in many instances no precursory symptom is observed, and the blood issues forth suddenly, with various degrees of force.

Passive or atonic epistaxis occurs, in general, without any preceding indication peculiar to it; and in many instances, particularly in the adynamic states consequent on fevers, it is not unfrequently accompanied with entire insensibility. In the cachectic states of the constitution giving rise to this kind of epistaxis, inordinate and uncontrollable losses of blood from the nose have most commonly taken place, and therefore have been more frequently the objects of attention in advanced than in early life.

Entonic epistaxis is always to be regarded as an indication of the urgent necessity for the system of the bloodvessels of the head to be relieved of a superabundance of this fluid; and so long as this condition lasts, it ought to be encouraged, or at least on no account restrained by direct suppression. It is often observed that the evacuation of a small quantity of blood from the vessels of this organ is the spontaneous cure of a severe headache, or relieves an oppressed state of the brain, dependent on preternatural fulness of its bloodvessels; and it is probable that apoplexies and other dangerous diseases of this organ have not unfrequently been stayed, if not entirely prevented, by this natural method of cure. In advanced life, however advantageous this hemorrhage proves under an immediate threat of such forms of disease, we must bear in mind that it is an indication of an altered condition of the bloodvessels of

the head, which pathologists have observed progressively to increase in the majority of persons after the middle period of life, and that it is often, on this account probably, the precursor of fatal apoplexies, epilepsies, palsies, and other cerebral diseases.

In a practical view we may consider epistaxis, in reference to the condition of the various organs of the body, and the positive disease (if any) with which it is accompanied, in the same light as artificial bloodletting, always remembering the importance and delicacy of the organ to which a determination is already established, or probably would be, if the exit of blood from the ramifications of the vessels supplying the nose were prevented: such diseases and conditions will require their peculiar kinds of treatment, and the avoidance of the exciting causes which produce this particular affection. It occasionally happens, however, that this evacuation is excessive at a single occurrence; or that by its continuance a passive state of the vessels is induced; or sometimes, independently of plethora, the evacuation becomes, by frequent recurrence, habitual, and, if not arrested, would be productive of consequences dangerous to life.

The particular treatment necessary to prevent an excessive or habitual epistaxis of the entonic kind is founded on two principles; 1st, diverting the determination of blood from the vessels of the head to other parts of the body; and, 2dly, the direct application of those means which are calculated to act on the extremities of the vessels themselves; which means consist of astringent substances and mechanical compression.

The former includes the various remedies which are comprehended in the antiphlogistic regimen, those being selected which are adapted to restore the particular function which may in each case have been suspended, and to produce a counterbalancing excitation in a system of vessels at a distance from the already overloaded vessels of the nares and head: hence the use of purgatives is particularly indicated; and in very plethoric habits a combination of such as stimulate the tract of the alvine canal, as well as excite its watery secretions, will be found advantageous.

Bleeding, also, from a vein in the arm or foot, or topical bleeding by leeches applied to the head, or by cupping on the nape of the neck, will be requisite in some cases in which the hemorrhage from the vessels of the nose may have been so small as to point out only the necessity of such an evacuation, but not sufficient to remove the occasion of it, and the symptoms with which it is accompanied. In habitual epistaxis, also, we shall find the necessity often of thus artificially changing the distribution of blood, and, by anticipating the periods of the return of this morbid disposition by proportionate bleeding, may at length be enabled altogether to prevent it.

Emetics have been occasionally of service, and are recommended by Stoll, on the principle of relaxing the capillaries; but unless epistaxis should appear to depend on an inordinate ful-

* Good's Study of Medicine.

ness of the stomach, impeding the due course of the blood in the large vessels, we should be wary in having recourse to them, for the very action they induce is an impediment to the free circulation of blood in the vessels which it is our object to relieve, and has occasionally been the cause of the affection which is to be removed. Sprinkling cold water on the face will often have a powerful effect in the suppression of this kind of hemorrhage, and even immersion of the whole head has been successful when other remedies have failed. A striking instance illustrative of this is recorded by Dr. Darwin, in his *Zoonomia*: the patient was a lady who had epistaxis for several days from a part of the nose to which the attempt to apply mechanical compression had failed, and in whom, from a preternatural sensibility of the pharynx, it was found impossible to stop up the posterior nares: venesection and the other usual remedies had been tried in vain; but by immersion of the head in a pail of water, rendered colder by the liquefaction of some common salt, the hemorrhage was checked, and did not return; but hardness of the pulse continuing, loss of blood from the arm on the following day was resorted to as a requisite precautionary measure.

Dashing cold water on the genitals has sometimes had an instantaneous effect in the suppression of epistaxis. In the same manner, the popular remedy of applying a large key or other piece of cold metal between the clothes and the surface of the back has caused it to cease. The exposure of the face to cold air, the observance of an erect position, with an inclination of the head backwards, cold drinks, and the application of cold water or ice to the nose, will often be sufficient to terminate this hemorrhage.

If these means, however, should fail, the nostril from which the blood issues should be stopped with a piece of lint or other soft substance, so that the retarded blood may coagulate, and thus produce pressure against the ruptured vessel: if this should not succeed, recourse must be had to astringents in preference to methods of compression to be presently described, and which, though perhaps more certain, are extremely disagreeable in their application, and need be resorted to only under urgent circumstances. Astringent applications may be used in the form of an injection with a syringe; or that of powder, carefully blown into the nostril through a quill: the method of inhaling them by an inspiratory action, as commonly advised, is apt to disturb any portion of coagulum that may be already formed, or to increase the excitation of the ruptured vessel itself. A variety of astringent applications have been recommended for the suppression of epistaxis; those most in use are vinegar and water, dilute mixtures of sulphuric acid with water or spirits of wine, spirits of wine alone, tincture of benzoin, solutions of alum, of the metallic salts, &c.; the two last mentioned are chiefly to be relied on, and should always be preferred. Two drachms of alum, or from two scruples to a drachm of sulphate of zinc, dissolved in half-a-

pint of distilled water, or the solution of the acetate of zinc of the Edinburgh Pharmacopœia, or a drachm and a half of the muriated tincture of iron, diluted with six ounces of water, will be suitable injections for this purpose: the common solution, also, of the acetate of lead, or the same salt in a much less diluted state, may also be used for the same purpose, after which a piece of lint, imbued with whichever of the solutions may have been preferred, should be passed up the nostril with a probe, or some such instrument, so that firm compression may be effected.

The powders to be used in the manner we have already stated, ought to be finely levigated; but even in this state the irritation they are apt to excite may be productive of consequences which would more than counterbalance the advantages to be expected from their astringent quality. The sulphate of alum and powder of galls have been usually preferred; a powerful styptic has also been found in charcoal, either used in the form of powder, or mixed with water and applied as a paste on a tent of lint. An instance of the successful use of the powder of gum acacia blown into the nostril in a case of epistaxis which had continued for two days, and had resisted the other means generally adopted, has been transcribed from Hufeland's *Journal* into the 27th volume of the *Medical Repository*. As this substance is not only free from the objection we have mentioned to astringent powders, but congenial to the sensibility of the Schneiderian membrane, and probably produces its good effect simply by increasing the tenacity and adhesive quality of the blood on its issue from the extremity of the bleeding vessel, it appears to us that in some cases it may be an eligible application.

Should the practitioner be baffled in his attempts with the means above suggested, or should the unsuccessful use of one astringent give little promise of advantage from another, direct compression may be made by passing a long piece of catgut from the anterior aperture of the nostril which is the source of the hemorrhage, so far into the pharynx, that by a pair of forceps it may be drawn into the mouth, in order that a piece of cotton or lint may be attached to it, of sufficient thickness to press against the parietes of the canal when the catgut is again retracted: this being done, it is to be separated from the lint or cotton, which is allowed to remain in the canal until further means shall have had the effect of suppressing the hemorrhagic tendency. Such is the method generally recommended by surgical writers, but the irritation excited on putting it into practice, and, when effected, the aversion expressed by patients to its endurance, are so great, that whatever the danger may be, they will rarely submit to or suffer its continuance for a sufficient length of time; and it must be acknowledged that there is some hazard that its removal may prove a fresh cause of excitement. A great surgical authority (Mr. Abernethy), with his accustomed humour, has told us that he knew that such a method could be adopted, for he had seen it done; but that whenever he had tried to do it

he always failed, finding an obstacle in the excessive irritation produced in the muscles of the pharynx: but the same authority has observed that he had never seen an instance of epistaxis which could not be suppressed, (and that he had seen a great many instances,) by the introduction of a cylindrical plug of lint through the anterior nares, made sufficiently large to fill the tubular part of the nostril, being first wetted and wound round a probe, so as to give it the form of a bougie, long enough to allow it to be passed along the floor of the nose from the anterior to the posterior aperture, but not into the throat; the probe being withdrawn when the lint has been thus disposed of. This plug should be allowed to remain in three or four days, while the proper means are taken to remove the causes of the occurrence of the hemorrhage.

The after treatment, which is usually of more importance than the immediate suppression of nasal hemorrhage, (for the latter will frequently cease as soon as it is desirable that it should do so,) consists in the pursuance of the antiphlogistic regimen to a degree commensurate with the urgency of the general symptoms and state of the body. It is necessary to consider how far it may be safe to regard the recurrence of an attack as the salutary consequence of the impeded function of a particular organ, or other coexistent disease; and how far, also, it may be reasonable to anticipate the practicability of the restoration of the one or the cure of the other, on which the hemorrhage may depend, without the hazard of a further loss of blood, if it should happen, exceeding the necessity of the system, or being otherwise disadvantageous to the circumstances of the patient.

We deem it superfluous to enter into a detail of the antiphlogistic means to be adopted; the general condition of the system affording the best indication of the extent of reduction which may be necessary. It will be evident that the causes which excite the attacks in the first instance must be avoided as those likely to promote their recurrence. The observations already made as to artificial bloodletting, purgatives, and emetics, will also be applicable to the state we are now considering. It may nevertheless be necessary to diminish the action of the heart and arteries further than it would be prudent to attempt by greater abstraction of blood, as well as to oppose the reactive tendency which may exist when this remedy has been adopted. In digitalis, or nauseating doses of tartrate of antimony, the suitable means will be found: one or both of these may be combined with the common diaphoretic saline draught and nitre, or other excitants of the skin and kidneys.

When this hemorrhage, either from long continuance or habit, has induced an atonic state of the bloodvessels, and a disposition to its inordinate or frequent recurrence is manifested, the internal use of diluted sulphuric acid, or superacetate of lead, may be advantageously had recourse to; and whether the hemorrhage be combined with an entonic or atonic condition of the body, if it have been excessive, or there should be reason to apprehend that it may prove so, experience has shewn that either of

these astringents will be a powerful adjuvant whether to the antiphlogistic or tonic plan of treatment, whichever may be directed to establish the contractility required in the ruptured end of the bleeding vessel from which the effusion may have taken place. This consideration leads us to notice a remedy,—the ergot of rye, which, from its powerful effect of exciting the natural action of the uterus, has been applied to a corresponding condition of the bloodvessels of that organ productive of hemorrhage, and, as it appears, with the desired effect: on the same principle it has lately been used in epistaxis;* and as it was followed by its cessation, further experience may determine it to be a valuable remedy in this as well as in other kinds of hemorrhage in which the bleeding vessels are reduced to an atonic state. Our present experience of it, however, in cases of epistaxis is too limited to enable us to decide on its eligibility.

In passive or atonic hemorrhage it is scarcely necessary to observe that those means which constitute the antiphlogistic regimen are inadmissible. The general treatment must be adapted to the disease, whatever it may be, which exists with this affection; and on some occasions, when the hemorrhage is excessive and exhausting, powerful stimuli will be required: a large dose of laudanum, with carbonate of ammonia and camphor mixture, may be given with advantage under such circumstances; brandy and water, brandy-gruel, wine, strong animal soups, and jellies will also be necessary to recruit the exhausted strength of a patient, weakened as he must be by the continued or repeated drain of this vital fluid, under circumstances of disease in which debility is a fearful, and in many instances an irremediable condition.

The local treatment consists of the application of astringents and the use of compression or stoppage by the insertion of lint or cotton, as advised in the local treatment of entonic hemorrhage; and must be immediately adopted, unless in some peculiar states of the bloodvessels of the brain, in which it is possible that the balance of advantages may preponderate in favour of a slight evacuation of blood from the vessels of the nose, even though they should be in a passive or atonic state: but as this occurs in the advanced stages of continued and eruptive fevers, or purpura hemorrhagica, or of scorbutus, accompanied with every other symptom of exhaustion, the oozing of blood should be restrained as soon as possible. It too often happens, however, under such circumstances, that the work of death is already begun, and that the arrest of the hemorrhage by mechanical and not vital power, proves but a feeble obstacle to its completion.

(W. Kerr.)

ERETHISMUS MERCURIALIS, mercurial erethism. The word *erethismus*, (from *ἐρεθίζω*, to excite or irritate,) is obviously a generic term which may be applied to any kind of morbid sensibility or irritability; but

* Med. Chir. Rev. July 1831.

it has hitherto been almost exclusively confined to that species of erethism which sometimes arises from the use of mercury, and to which the appropriate name of *erethismus mercurialis* was given by the late scientific John Pearson, to whom we are indebted for the first notice of the disease. Prior to the period at which that distinguished surgeon was elected to the charge of the Lock Hospital, a year seldom elapsed without the occurrence of two or three sudden deaths, without any assignable cause, among the patients who were undergoing a mercurial course. These were, in truth, cases of mercurial erethism, the nature of which was not then understood. Mr. Pearson has well described the disease as characterized "by great depression of strength; a sense of anxiety about the præcordia; irregular action of the heart; frequent sighing; trembling, partial or universal; a small, quick, and sometimes intermitting pulse; occasional vomiting; a pale, contracted countenance; a sense of coldness: but the tongue, (Mr. Pearson adds,) is seldom furred, nor are the vital or natural functions much disordered." The affection appears to arise from mercury acting as a poison. So great is the danger attending this affection in its severer form, that any sudden or violent exertion may prove immediately fatal. Happily, however, its first appearance may be readily detected, and, by prompt measures, effectually removed. A tremulous motion of the tongue, a slight trembling in the limbs, or a sense of fluttering within the chest, are among the earliest indications of its approach. The pulse becomes feeble, hurried, and irregular, sometimes intermitting for several seconds, and then beating with great rapidity. On applying the hand to the left side of the chest, the heart will be found to act with extreme irregularity.

This peculiar irritation may arise from the administration of mercury in any form; and may occur during any period of a mercurial course, though most commonly at its commencement. The exact circumstances which favour its occurrence in the particular individuals attacked have not hitherto been ascertained. The writer of this article, while resident medical officer of the Lock Hospital, has seen it produced by the inunction of a single drachm of mercurial ointment, and reproduced, in the same individual, after the discontinuance of the medicine for a whole month, by three frictions, each consisting of only one drachm of the ointment. It is remarkable, however, that in the greater number of instances, a full and adequate course of mercury has been afterwards borne, without any recurrence of erethismus, by the very persons who had suffered from it during the commencement of the course.

The treatment of the mercurial erethismus is as simple as it is effectual. *The open air is the grand antidote.* As soon as the slightest intimation of the disease is perceived, the patient should be carried into the open air, with as little exertion to himself as possible, and there he should remain as long as may be

practicable. To use Mr. Pearson's words, "he should *live* there." Mercury, in every form, must be immediately discontinued, and a mercurial atmosphere carefully shunned. If inunction have been used, the skin should be thoroughly cleansed from any adhering ointment. The subcarbonate of ammonia, either with or without camphor, is an important auxiliary, and may be given in rather full doses, at moderate intervals, until the circulation becomes more steady, and the general power of the system revives. It is an important and encouraging fact, that from the time at which this treatment was adopted by Mr. Pearson, not a single death occurred from erethismus at the Lock Hospital.

After an attack of mercurial erethism, great circumspection will be needful both as to the time of recommencing, and the mode of conducting, the mercurial course. In the slighter cases, the disease entirely subsides in five or six days, and even in the severer forms the mercurial treatment may often be safely resumed within a fortnight. Still the most watchful care must attend every remaining step of the course.

The reader may consult with advantage Pearson's Principles of Surgery, and the observations, by the same author, of the different articles on the *Materia Medica* which have been employed in the cure of *Lues Venerea*.

(T. H. Burder.)

ERYSIPELAS. This term is derived, according to some authors, from *ἐρύω*, to draw, and *πέλας*, adjoining; implying that the disease has a tendency to spread to the adjoining portions of skin. Various other derivations have been suggested, but that now adopted appears to be the more correct. It was termed by the Greeks *ερυσίπελας*, by the Romans *Ignis Sacer*, and is known in popular language by the name of *the Rose*, from the colour of the skin, and by that of *St. Anthony's fire*, from the burning heat with which it is accompanied.

Erysipelas may be defined, inflammation of the skin, either alone, or combined with that of the subjacent cellular tissue; generally, though not always, accompanied with vesicular eruption, the local affection being attended by symptomatic fever.

The confusion and contradiction which have existed among practical writers respecting the nature of erysipelas, have in some measure arisen from attempts to found a correct classification of its varieties on some unimportant circumstances in its progress. For example, Cullen places erythema and erysipelas, which are certainly only modifications of the same disease, under different orders. He classed the former among the Phlegmasia, the latter among the Exanthemata or rashes. It is evident, however, that he was aware of their identity, as he laid down their diagnosis with great accuracy in the following passage. "When the disease is an affection of the skin alone, and very little of the whole system, or when the affection of the system is only symptomatical of the external inflammation, I shall give the disease the name

of erythema; but when the external inflammation is an exanthema, and symptomatic of an affection of the whole system, I shall then name the disease erysipelas.* If Cullen intended to apply the characters of his order Exanthemata to erysipelas, it must be observed that it does not correspond in its most important features with this order.

Willan† and Bateman‡ classified erythema and erysipelas according to their occasional external characters. Thus erythema is placed among the Exanthemata, and erysipelas among the Bullæ. This classification would be less exceptionable were vesication an invariable accompaniment of the cutaneous inflammation; but when we consider the occasional absence of this symptom in erysipelas, it is clear that any nosological arrangement founded on an appearance which is not invariably observed, can only lead to confusion and misapprehension.

J. P. Frank§ has adopted Cullen's classification as to erysipelas, but includes erythema among the Impetigines, while Rayer|| after grouping together erythema and erysipelas, places them among the Exanthemata. Mr. Lawrence¶ considers erysipelas to be inflammation of the skin, but that like other inflammations it varies in degree. When it affects the surface of the skin, which is red, not sensibly swollen, and without vesication, it constitutes erythema. When the inflammation is more violent, so as to produce swelling of the skin, or in still more severe cases, when the cellular and adipose membrane, as well as the skin, become inflamed, he designates the disease erysipelas.

Varieties of erysipelas.—The various forms of erysipelas depend on the degree of the local inflammation, the type of the accompanying fever, and on particular circumstances with which the case may be complicated. A full account of the varieties of this disease will be found in the article ERYTHEMA.

Various divisions of erysipelas have been proposed. Some writers, as Burserius, have founded distinctions on its supposed causes. This author divides it into three species: 1. *primary* or *idiopathic*; that is, arising spontaneously from an internal cause, not preceded by any other disease; 2. *symptomatic* or *secondary*, supervening on another disease, by which its progress is influenced; 3. *accidental*, when it is excited by some obvious external cause.

Others, again, have divided the disease into *idiopathic*, (from an internal cause,) and *traumatic*, (from an external wound.) Later writers have introduced subdivisions from differences in the degree of local inflammation. This seems to have been the ground of Willan's and Bateman's classification: viz. 1. *phlegmonous*; 2. *œdematous*; 3. *gangrenous*; to which they add, 4. *erratic*, (migratory.)

Another distinction has been made, according as the disease appears on different regions of the body, viz., *erysipelas of the face and head, of the trunk, and of the extremities*.

We shall describe three forms or varieties: 1. *simple erysipelas*; 2. *phlegmonous erysipelas*; 3. *œdematous erysipelas*; and afterwards point out some differences depending on its situation on the several regions of the body.

1. *Simple erysipelas.*—In this, which is the mildest form of the disease, the inflammation is confined to the skin, which is hot, smooth, red, and shining; the colour varying from a bright scarlet to the more deep rosy or livid tint.

The swelling is either so inconsiderable as to be scarcely perceptible, or, when the inflammation is in a greater degree, an evident tumefaction is felt on passing the finger over the inflamed surface. When the inflammatory action is still more considerable, effusion takes place into the subjacent cellular tissue; and when this happens, the swelling is proportionably increased. The accompanying pain, which varies according to the intensity of the local disorder, is of a pungent burning kind, very different from the throbbing or pulsatile pain of phlegmon. About the third or fourth day after the appearance of the disease, vesications form on different parts of the inflamed skin, after which there is a sensible diminution of the local suffering. The vesicles are sometimes small and numerous; occasionally they are of a larger size, and in a day or two either break and discharge their contents, or the fluid dries into hard yellow crusts, which fall off, leaving the subjacent skin sound, or sometimes abraded. In very mild cases the local symptoms disappear without vesication or even desquamation of the cuticle; more generally, however, when the inflammation ceases, the cuticle becomes detached and falls off in successive portions. Although in by far the greater number of cases the disease is thus terminated, in some instances its disappearance from one part of the skin, more particularly if sudden, is followed by its appearance on some other part. When erysipelas shews this tendency to metastasis or translation, it constitutes the *erratic* form described by Willan and other authors. In such instances it is important to watch the condition of the internal organs, more particularly if the recession of the erysipelatous inflammation be followed by symptoms which indicate visceral disease.

Swediaur* gives the case of a robust plethoric man, 55 years of age, who had for many years laboured under paroxysms of gout, which returned at stated periods. He had been free from his gouty attack for a longer period of time than usual. The eyelids became suddenly swollen; two days after, the œdema disappeared from the palpebræ; he then complained of pain in the throat and difficulty in swallowing. This was soon removed by the use of gargles, when the œdema of the eyelids returned: in a few days afterwards the fingers of the right hand became in succession red and swollen, and subsequently ulcerated. The man

* First Lines of the Practice of Physic, sec. 274.

† On Cutaneous Diseases, Order iii. Genus 6, and Order iv. Genus 1.

‡ Practical Synopsis, pp. 117 and 124.

§ De Curandis Hominum Morbis, Lib. iii.

|| Traité des Maladies de la Peau.

¶ Med. Chir. Trans. vol. 14.

* Nov. Nos. Meth. Syst. vol. ii.

then recovered. After the lapse of some months the disease returned, and assuming the same migratory course, fixed in the feet, where it produced ulceration, on the healing of which the patient's health was completely restored.

Frank* relates the history of a woman in whom erysipelas migrated from the face to the feet, thence to the hip, and afterwards re-appeared on the face. After it disappeared from the face, the intestines became affected; soon afterwards she was seized with disease successively in the chest and in the brain.

Willan gives the only case of erratic erysipelas which had in his experience proved fatal. A labouring man, aged 44, after much fatigue and exposure to cold, became affected with cough, shortness of breath, and febrile symptoms. Five days afterwards an erysipelatous patch appeared on his left shoulder, and another on the left leg. On the seventh day, similar patches appeared above and below the knees. On the eighth day the eyelids became tumid and red. About this time the other swellings assumed a livid hue, the febrile symptoms increased, and were attended with deafness and coma. On the ninth day the tumour of the right eye extended to the temple, upon which small phlyctenæ soon after formed. On the eleventh and twelfth the patient seemed totally insensible; his pulse became feeble and irregular, and he died on the following day.†

2. *Phlegmonous erysipelas*.—In this form the inflammation affects the skin and the subjacent cellular and adipose tissues, and generally terminates in suppuration, and even sloughing of the affected parts. It generally occurs in young plethoric persons; those in more advanced life, however, are not unfrequently the subjects of it, though its progress is more rapid, and its duration shorter, in young than in elderly people.

Phlegmonous erysipelas appears more frequently on the extremities than on any other part of the body. The fever with which it is accompanied is of the inflammatory character; and occasionally symptoms of gastric disturbance arise, either at the beginning or during its progress. The redness of the skin is of a deep tint, and, as in other forms of erysipelas, disappears on pressure. The pain is severe, and accompanied with a sensation of burning heat, while, in consequence of the effusion which takes place into the subcutaneous cellular membrane, the affected parts communicate a peculiar feeling, which has been expressed by the term *brawny*.

When the disease has gone on for four or five days, vesications appear, and go through the same changes as in simple erysipelas; or sometimes, instead of this process, desquamation of the cuticle takes place. The redness then declines, the skin assumes a yellow tinge, the swelling and febrile symptoms gradually subside, and the disease may thus end in resolution. This favourable termination is by no means common. Phlegmonous erysipelas more

commonly ends in suppuration, and even in gangrene, the purulent matter in the former case being either confined in small abscesses, or diffused in the cellular membrane.

When gangrene takes place, the cellular membrane becomes completely disorganized, and, according to the description of Mr. Lawrence, appears like a dirty spongy substance filled with turbid fluid; then losing its vitality altogether, it is converted into more or less considerable fibrous shreds of various size and figure, which come away, soaked with matter like a sponge; while the integuments, being deprived of their vascular supply, become livid, and often lose their vitality. When these changes take place, the tension of the previous inflammatory stage is succeeded by a peculiar softness; the sensation thus imparted has been compared to that excited by a quagmire or morass, and hence the term *boggy* has been given to it.

When an entire limb is affected with phlegmonous erysipelas, the inflammation and subsequent disorganization of the cellular tissue is not confined to that portion which is immediately under the skin, but extends to the intermuscular stratum. Should the patient survive such an attack, the skin, fascia, muscles, tendons, and bones, as stated by Mr. Lawrence, are so agglutinated and fixed, after the extensive destruction of the connecting cellular tissue, that the motions of the part are permanently and seriously impaired.

Various morbid appearances in the internal organs have been discovered in fatal cases of phlegmonous erysipelas. These organic inflammations, which were evidently the more immediate cause of death, have been often unaccompanied by symptoms by which their existence during life could be ascertained.

3. *Œdematous erysipelas*.—This species, which may be said to be intermediate between the simple and phlegmonous, is observed chiefly in persons of impaired constitution, or in those who have a tendency to dropsical effusion. The skin, which is of a pale red colour, inclining to a yellowish brown, is smooth and shining, but less hot and painful than in the other forms. The inflammation is of the subacute kind, and gives rise to serous effusion; the swelling extends slowly and gradually, leaving the impression of the finger as in anasarca, from which circumstance this form has received its distinctive appellation. In the more acute cases thin purulent matter is often mixed with the serosity. Vesications are less commonly observed in œdematous erysipelas, and the vesicles are smaller, less elevated, and more numerous than in either the simple or phlegmonous forms.

It is very liable in some situations to terminate in gangrene; this is announced by the redness changing to a livid hue, and by the cessation of pain. Hence, when erysipelas appears on the genital organs, or on dropsical limbs, when the skin is much distended, or when punctures have been made with the intention of allowing the fluid to drain off, gangrene frequently supervenes. When, therefore,

* De cur. Hom. Morbis, vol. ii.

† Willan on Cutaneous Diseases.

it is deemed advisable to puncture dropsical parts, the best mode of preventing such consequences is to insert a fine couching needle under the skin at short distances. This mode has been found preferable to making small incisions with the lancet, in so far as it is seldom followed by erysipelas.

4. We shall next advert to some differences in the local and general symptoms of erysipelas, depending in some measure on the situation of the part on which it appears. It is a matter of daily observation, that when erysipelas occurs on the extremities, it is less severe than when it appears on the trunk: it is almost invariably confined to one limb, and seldom attended with danger, unless, from its proximity to any of the larger joints, articular inflammation arises, which may terminate in effusion, or some other consequence of synovial inflammation.

In no region of the body is erysipelas more formidable and dangerous than on the face and scalp. The severity arises chiefly from the inflammation of the brain or its membranes, which almost invariably supervenes. Erysipelas of the face or scalp (to which the name *sideratio* has been given) is preceded by two or three days' smart febrile indisposition. The redness appears on some part of the face, from which it gradually spreads: it is sometimes confined entirely to the side of the face in which it first appeared; but more generally it is diffused over the whole face, forehead, and scalp; and occasionally creeping down the neck, extends to the shoulders and trunk. In other cases it first appears around some slight wound, such as those made by leeches or by the cupping scarificator, or around the margin of a blister: sometimes it succeeds to an external injury of a more severe kind, a lacerated or contused wound of the scalp. As the disease advances, the face, and more particularly the eyelids, become swollen; the vessels of the head pulsate strongly; delirium, at first transient, but afterwards constant, comes on, succeeded by drowsiness or coma; vesications or desquamation of the cuticle take place about the fourth day, after which the local and general symptoms abate: in more severe cases, however, the symptoms in the brain increase; the delirium increases; the patient either becomes furious, or falls into a state of perfect insensibility, and after lingering till the tenth or twelfth day, dies from the effects of cerebral inflammation. In other instances, in which the brain affection has been less intense, external abscesses form, most frequently on the eyelids: occasionally the matter becomes diffused in the cellular tissue of the scalp, or when the inflammation has terminated in gangrene, sloughing of this membrane takes place, the pericranium being often detached, to some extent, from the cranial bones. The parotid and cervical glands become inflamed in severe cases, and not unfrequently abscesses form in the cellular tissue in which they are embedded.

It is necessary to notice a form of pharyngeal inflammation which has been observed when erysipelas is prevalent at certain seasons, or appears in some localities as an epidemic.

Some have described this affection as erysipelatous inflammation of the throat; and although this term conveys a pretty accurate idea of the nature of the disease, we think the application of the term erysipelas to inflammation of mucous membranes incorrect, inasmuch as the term ought to be restricted to cutaneous inflammation. In the affection to which we allude, though there is fever, and pain in the throat, especially on deglutition, there is little swelling, but general redness of the fauces.

Dr. Stevenson,* who has given a condensed but good description of the disease as it appeared at Arbroath, states that in some cases the inflammation was confined to the fauces; in a few, however, it spread to the larynx, producing symptoms very like idiopathic croup; in others it extended to the pharynx and oesophagus, when he remarked that though fluids and solids could be partially swallowed without much apparent difficulty, after a few seconds the patient felt pain in the gullet, followed by inverted action and partial or complete rejection of the food. In the more protracted cases swelling and suppuration of the cervical glands took place. It has been also remarked, that while in some individuals this affection was confined to the throat, in others, after commencing in the fauces, the inflammation spread to the face and head, giving rise to erysipelas when the cutaneous structure became affected. This circumstance, and the occurrence of this affection of the throat at the time when erysipelas was prevalent, besides the fact that in erysipelas of the face the inflammation frequently spreads from the face to the mucous cavities of the nose and mouth, shew that the diseases are essentially the same, modified only by the difference of the structure in which they occur.

In the London Fever Hospital, as well as in general hospitals, erysipelas is by no means uncommon. Of protracted cases of malignant fever especially, it is a frequent and dangerous consequence; and we have occasionally observed that the inflammation commenced and was confined entirely to the throat: more generally, however, the inflammation, after beginning in the throat, has spread from the mouth to the cheek and face, or through the nostrils to the nose, and thus erysipelas has been propagated to the face and head. When this form of pharyngeal inflammation is confined to the throat, it appears to us to be in some measure allied to the *Diphtherite* of which Bretonneau has given an excellent description. There is, however, no pellicular or membranous exudation, which forms the characteristic distinction of diphtherite—indeed, in several fatal cases, in which this pharyngeal inflammation was combined with erysipelas of the face and head, we have found scarcely any traces of the previous existence of inflammation. There cannot, however, be the slightest doubt of the inflammatory nature of the affection we are now describing, though it does not induce any of the morbid products of inflammation.

* Med. Chir. Trans. of Edin. vol. ii.

Although erysipelas seldom appears before the age of puberty, a severe form of it occasionally occurs in infants a few days after birth, sometimes, however, so late as the eighth or ninth week. Infantile erysipelas, as it is termed, is more common in lying-in hospitals than in private practice. It appears first on the lower part of the abdomen or on the genital organs, and gradually extends down the thighs. The skin is not much swollen, but becomes hard and of a dark red or livid colour: vesication and gangrene follow, and the genitals are not unfrequently entirely destroyed. This form of erysipelas generally terminates fatally. A milder species is occasionally observed in the hands and feet, and sometimes about the neck or face. It generally lasts twelve or fourteen days, and then disappears, though sometimes it terminates by suppuration and the formation of small abscesses.

Nature of erysipelas.—Great diversity of opinion has prevailed as to the true pathology of this disease, and consequently as to the mode of treatment to be pursued. The ancients attributed this, in common with every acute disease, to supposed acrimony of the fluids, which idea was apparently strengthened by the vesication which frequently arises in its progress, as well as its occasional termination in effusion, suppuration, or gangrene. The more rational and consistent views of pathology which the doctrines of solidism introduced, have tended in a great measure to throw discredit on the application of the humoral pathology to erysipelas.

From the history and progress of the disease which we have laid before the reader, the acute nature of erysipelas is apparent. We have seen in the local symptoms the most satisfactory proofs of inflammatory action—redness, heat, pain, and swelling: moreover, if we trace its termination in resolution, effusion, suppuration, and gangrene, the conclusion, according to the soundest principles of pathology, is, that wherever erysipelas appears, there is inflammation of the skin, or of the cutaneous and cellular tissue combined.

If we advert to the general or constitutional symptoms, we find they are exactly proportionate to the extent and intensity of the local affection. Again, we have stated, that in the more severe instances of phlegmonous erysipelas, inflammations of internal organs arise; and if the opinion of M. Ribes be correct, that in erysipelas the internal tunic of the veins and arteries of the integuments is inflamed, and that these vessels occasionally contain pus, we have a further corroboration of the inflammatory nature of the disease. It must, however, be kept in mind, that in one case the cutaneous inflammation may be so trivial as scarcely to produce disturbance in the system; in a second, the local symptoms are more severe, and accompanied with corresponding general excitement; in a third, the local symptoms may be acute, but the powers of the patient may be feeble, or the fever with which they are accompanied, of the low or typhoid form. To

us it appears that the conflicting and very opposite opinions which have been and still are entertained of the nature of erysipelas, would be brought to harmonize, if more attention were paid to the prevailing character or type of the disease, the duration or stage when the practitioner is consulted, the age and individual peculiarities of the patient, and the treatment which has been adopted in the early commencement of the disease.

Though in the majority of instances the symptomatic fever is acute, such as always accompanies inflammatory diseases, yet, in many cases, especially in the aged, in persons addicted to intemperance, in those who are the subjects of organic disease—or when erysipelatous inflammation supervenes on protracted convalescence—moreover, at certain seasons or in particular years,—the local symptoms are attended with a low form of fever, which does not well bear active depletion, the modified antiphlogistic treatment being more successful. Indeed, as the disease advances, more generous diet, and in some instances the employment of stimulants are found necessary.

This low symptomatic fever, however, is only occasionally observed; it forms the exception, not the rule, and leads to the practical inference, that this disease cannot be successfully treated upon one invariable principle; that the various circumstances pointed out should be kept in mind before we decide on its precise nature, and the line of treatment to be pursued. If the practitioner acts with the caution suggested, keeping in mind the principles we have laid down, he will seldom fail to form a proper judgment of any case he may be called on to treat. In fact, such variations of type are not peculiar to erysipelas; they are constantly observed in all febrile diseases. Epidemic fever, small-pox, measles, and scarlet-fever vary much in their symptoms and general aspect at different times.

Causes.—It is in most instances difficult to trace the exciting causes of erysipelas. When it occurs after local injury, we have at once a probable reason for the surrounding integuments assuming inflammatory action: still, as erysipelatous inflammation does not succeed to external injury in every case, some other circumstances must concur to induce it in those instances in which it succeeds to accidents or operations. There is in many persons a disposition to inflammation of the skin on the most trivial irritation; in such there is, no doubt, some peculiarity in the vascular system of the integuments; so that any causes which excite the circulation either generally or locally, may induce erysipelas.

It is frequently dependent on gastric derangement, and from the intimate sympathy which exists between the skin and mucous membranes, irritation of the stomach and bowels may become not only a predisposing but an exciting cause, especially when there is susceptibility to this disease. On the other hand, the irritation in the skin during attacks of erysipelas frequently induces sympathetic disorder of the biliary and gastric

system. Hence the origin of the term *bilious*, applied to those cases in which the erysipelatous inflammation is accompanied with gastric derangement.

Some persons, more particularly elderly persons of a cachectic habit, and females about the period of the cessation of the catamenia, are liable to periodic attacks of erysipelas, which are generally preceded or accompanied by symptoms of derangement in the stomach and bowels, but seldom with fever. When the erysipelatous inflammation in such cases appears on the extremities, it sometimes induces thickening of the skin, and occasionally superficial ulceration, which proves troublesome and tedious to heal.

Besides the origin of erysipelas from causes originating within the system itself, it appears to prevail more at certain seasons than at others. The spring and autumn are the periods of the year when it is most prevalent; it occasionally assumes an epidemic or endemic character, from which circumstance it has been supposed to be engendered by a particular condition of the air, or at all events to be materially influenced by atmospheric causes.

There have been at various times visitations of epidemic erysipelas. It appeared at Toulouse in 1716, when from its great fatality it was compared to the plague. De Haen,* Bartholine,† Silvius de la Boe,‡ besides other writers, describe an epidemic erysipelatous fever, which was accompanied with inflammation in the stomach and duodenum.

Bromfield§ mentions erysipelas of the head, which was epidemic for two years. Evacuations generally proving fatal, it was treated by bark and cordials.

When erysipelas is epidemic, it is severe and often fatal. The inmates of crowded establishments, more especially of hospitals for the reception of the sick, situated in the vicinity of those districts in which it is prevalent, are particularly liable to its attacks; and so long as the epidemic prevails, the slightest causes are often sufficient to produce the disease. It is, however, more likely to occur in those persons whose health has been previously broken by protracted diseases. It is also a frequent concomitant or consequence of fever treated in hospitals, though it rarely occurs among fever patients in the better class of society. When hospital erysipelas once appears in the wards, it is most difficult to prevent its spreading; and although it succeeds to operations, wounds, or injuries, or supervenes on some slight irritation of the skin, as, for instance, around the incision made by the lancet in venesection, or by the cupping scarificator, or appears around the leech-bites, or the margin of a blistered surface, it frequently arises spontaneously on various regions of the body, in patients whose local disease is not accompanied by an external wound. It has

been sometimes so formidable in hospitals, as to render it necessary to shut up particular wards, and even to delay the performance of surgical operations, the most unimportant being at such times followed by severe and often fatal erysipelatous inflammations.

When erysipelas succeeds to external injuries, such as accidents or operations, it may often be traced to imprudence on the part of the patient, more particularly to errors of diet, or to mental or bodily excitement. In many instances the occurrence of erysipelas after operations or injuries, is the result of unskilful local or general treatment on the part of the surgeon, and more particularly of the neglect of the cooling antiphlogistic treatment during the constitutional excitement which generally follows capital operations.

Erysipelas may also arise from local irritation, long-continued or undue pressure, improper exercise of an inflamed part, or the application of stimulants or irritants to sound or ulcerated parts.

Well authenticated facts warrant the conclusion that under certain circumstances erysipelas may spread by contagion; rarely, however, in clean and properly ventilated dwellings. It is in vain to urge the fact of the disease spreading from person to person, as its propagation might be the consequence of exposure to the same causes; but when we find persons who, after becoming infected apparently from attendance on erysipelatous patients, remove as soon as they become ill to another residence at some distance, and communicate the disease to the family, the irresistible conclusion is, that erysipelas in such cases has been communicated by contagion.

Ample proofs of the truth of this opinion will be found on reference to the papers of Dr. Wells,* Dr. Stevenson,† Dr. Gibson,‡ Mr. Arnot,§ Mr. Lawrence,|| and others. A short abstract of the most striking facts is subjoined. Dr. Wells was called to attend an elderly man with erysipelas of the face, which proved fatal. His wife was seized with it a few days after his decease, and also died. Five weeks after, the landlady who resided in the same house had erysipelas of the face, but recovered. The nurse, who attended the landlady, was attacked with the same disease, and died in the parish workhouse. The nephew of the person first attacked was taken with erysipelas shortly after visiting his uncle, and died in a few days.

In another case which subsequently came under Dr. Wells's observation, the patient had been for some time at the bed-side of a female friend who had erysipelas of the face,

* Ratio Medendi.

† Hist. Anatom. Rat. Hist. 56.

‡ Prax. Med. Appendix, tract. x.

§ Surgical Cases and Observations.

* Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, vol. ii.

† Transactions of the Medical Chirurgical Society of Edinburgh, vol. ii.

‡ Ibid. vol. iii.

§ London Medical and Physical Journal, March 1827.

|| Medico-Chirurgical Transactions of London, vol. xiv.

which proved fatal. Two sisters of this lady, two servants of the family, one of whom had acted in the capacity of nurse, had all the same disorder. Dr. Wells states, in explanation of these facts being regarded as indicating only the great prevalence of erysipelas from some general cause, that he saw no more than two other instances of the disease during the time they happened.

A person, with erysipelas of the face, was brought to St. Thomas's Hospital, where he died. From inadvertence, another patient having a different disease was put into the same bed, before it was properly aired; soon afterwards this patient had erysipelas of the face. Several other persons about this time were attacked with this disease, among whom was an upper nurse, or sister, to whom it proved fatal.

A lady was attacked with fever immediately after delivery, accompanied with erysipematous inflammation of the skin. The infant was seized three days after birth with erysipelas about the pudenda, which spread to other parts of the body, and even to the face. Both the mother and infant died after a few days' illness. The lady's mother and servant-maid, both of whom had nursed the infant, were seized with erysipelas of the face, from which both recovered.

Dr. Stevenson details briefly the results of twenty-one cases of erysipelas, which occurred in his practice in 1821-2. It spread, in many instances, through the members of the same family; in some it appeared soon after visiting friends or relatives during the period of the disease. A person, who was attacked while in attendance on an erysipematous patient, went home to her parents, who resided at some distance, as soon as she was taken ill: they were soon successively seized, and the mother died in a few days.

In corroboration of these facts, Dr. Gibson brings forward other instances which came under his observation in 1822.

A young man, with erysipelas of the face, was brought to his father's house, at the distance of some miles. He ultimately recovered. His master had died a few days before of a febrile disease. The father of this young man was attacked with erysipelas in both hands and arms, which spread to the face. He died in a few days.

The infant son of a gentleman was seized with erysipelas on one foot. The mother was afterwards seized with erysipelas of the face and scalp. The nurse, who suckled the child, was seized with symptoms of pneumonia, and was removed to her father's house four miles off. Her father, who had some days before her arrival received a wound of the scalp, was seized with erysipelas of the face and scalp, and died soon afterwards. A sister, living in the same cottage, had fever with sore throat, from which she slowly recovered. Two children in the same house were cut off with what appeared to be croup. The disease in the sister and children was no doubt erysipematous inflammation of the fauces and trachea.

The next case resembles that related in the paper of Dr. Wells. A woman was admitted into the infirmary of Montrose, with suppuration of the hand, which had followed an attack of erysipelas. Some days after her admission, the patients in the two beds next to her were seized with erysipelas. It was afterwards found that, notwithstanding all the patients were removed from that ward, and the process of cleansing, white-washing, and fumigation adopted, the disease again re-appeared when fresh patients were placed in this ward, so that it became at length necessary to shut up the infirmary for a time.

Mr. Lawrence mentions an instance in which erysipelas of the face, caused by a seton in the neck, seems to have affected two individuals by contagion, producing erysipelas of the face in one, and of the lower extremities in the other.

Diagnosis.—There are few external diseases which, from their resemblance to erysipelas, are likely to render the diagnosis perplexing. The diffused rosy tint of the skin, the uniform swelling, the peculiar burning pains, the tendency of the disease to spread, the vesication or desquamation of the cuticle, and the undefined suppuration and sloughing of the cellular tissue in the advanced stages, are sufficient to point out its nature, and to distinguish it from phlegmon.

Prognosis.—Many general as well as particular considerations influence the prognosis. Some varieties of the disease are more dangerous than others. Simple erysipelas is always a mild disorder; the phlegmonous and oedematous forms are generally severe, often fatal. When the inflammation is extensive, and terminates in gangrene and sloughing of the skin and cellular membrane, the powers of the patient often give way under the disease. It is more dangerous in some situations of the body than in others; for instance, when it attacks the face and head, there is great danger; when it occurs on the chest or abdomen, it is more hazardous than on the extremities.

As a general rule it is more dangerous in elderly than in young persons. Infantile erysipelas is an exception to this remark; this form being extremely fatal, more especially that which commences about the genital organs, and spreads upwards over the abdomen and down the thighs.

Any disease with which the erysipematous inflammation is complicated, has an important influence on the prognosis. When it occurs in persons who have organic disease; when it attacks convalescents from long continued acute affections, or those whose strength is exhausted by chronic disease; when it occurs on the extremities of dropsical subjects, or after severe injuries or surgical operations, the result is doubtful, and therefore the prognosis should be guarded. If again, during the progress of the erysipelas, the brain or any other important organ become inflamed, more especially if the inflammation suddenly leave the skin, and is followed by symptoms of in-

ternal inflammation, there is considerable danger, unless the most vigilant treatment be adopted. Hence in erysipelas of the head, the state of the brain should be minutely watched. When it appears on the chest, the pulmonary organs sometimes become inflamed; or when it spreads to the abdomen, inflammation of the peritoneum or mucous membrane of the intestines sometimes takes place.

Lastly, when erysipelas prevails epidemically, the disease is usually more severe and fatal than when it is sporadic. It is also more fatal at certain periods than at others, from causes which are unknown.

Treatment.—From the account which has been given of the different forms of erysipelas, and from the various conditions of the system under which it takes place, it is evident that the principles of treatment require to be modified according to the symptoms and the circumstances of each case; hence it will be proper to consider the age of the patient, the state of the general powers, the type of the accompanying fever, the seat and intensity of the erysipelatous inflammation, and particularly the duration of the disease.

It is known from experience, that acute disorders do not always bear the same treatment; and this remark applies equally to erysipelatous inflammation. Hence, at one time, strict antiphlogistic treatment may be necessary, while at another period, the system will not bear the same bold measures, although a modification of the same curative principles be indicated. Consequently, in one case it may be necessary to bleed generally and locally,—often to a considerable extent; a second may require topical bloodletting only; in a third, the symptoms often yield to mild purging, saline medicines, and abstinence; in a fourth, from the depression of the system, it may be necessary to administer nourishment and even stimulants, while at the same time blood is taken from the inflamed surface; in a fifth case, powerful cordials are required to support the sinking powers. It may, however, be affirmed that, in the majority of instances, the disease requires antiphlogistic treatment.*

We shall notice the measures to be adopted in the different varieties of erysipelas.

1. Simple erysipelas, being only a very slight form of cutaneous inflammation, in general yields readily to aperients and cooling remedies. If the erysipelas appear on the extremities, it will be necessary not only to abstain from using the limb, but to keep it in the horizontal posture, and to avoid any causes of local irritation, more especially friction. In some cases it may be necessary to apply leeches, and afterwards warm fomentations, or a tepid lotion. Puncturing the inflamed skin with the point of a lancet is a very good mode of local bleeding in slight cases, and may be resorted to in preference to the application of leeches.

* Oportet, si vires patiuntur, sanguinem mittere; deinde imponere simul repimentia et refrigerantia. — *Celsus de Medicina*, lib. v. cap. 25.

2. Phlegmonous erysipelas is, of all the forms of the disease, the most acute, both as regards the local symptoms and the inflammatory type of the fever with which it is accompanied.

The whole aspect of the disease is such as at once to indicate the necessity for active measures.

In general, bloodletting is indispensable; and when the disease occurs in the face and scalp, it is necessary to bleed largely and repeatedly till the head-ach and other symptoms denoting cerebral affection are removed. Local depletion by cupping or leeches, and the application of a cold lotion to the scalp, will form a good auxiliary to the use of the lancet, and in some instances may entirely supersede general bloodletting; indeed, Mr. Lawrence seems disposed to consider the local abstraction of blood more serviceable than venesection.

Active purgatives, antimonial preparations, cooling drinks, abstinence from animal food of every kind, as well as from wine and fermented liquors, and quietude of body and mind, constitute the general summary of the means to be pursued in the commencement of this form of erysipelas. This active treatment is required only when the patient is young and plethoric, and when the local and general excitement is such as to warrant its adoption.

Phlegmonous erysipelas occurs not unfrequently in persons advanced in life, or in individuals whose powers are feeble; in such cases, and in the later stages of the disease, the active measures just recommended would not only be injudicious but positively injurious. In the instances alluded to, the local symptoms may exhibit more or less activity, but still the general powers are weak; topical bleeding therefore, if the powers permit, while we endeavour to sustain the system by nourishment and small quantities of cordials, regulating at the same time the bowels and the various functions according to particular indications, will give the patient the best chance of recovery. Cold applications, composed of equal parts of diluted alcohol, solution of acetate of ammonia and of water, or a lotion consisting of one drachm of carbonate of ammonia, and one of superacetate of lead dissolved in a pint of rose-water, seem to have considerable influence in arresting the processes of effusion and suppuration.

If the erysipelatous inflammation do not yield to the active measures recommended, or if the practitioner be not consulted till the advanced stage of the disease, further depletion will not arrest its progress, but only exhaust the powers of the patient.

The constitutional excitement which characterized the early stage of the disease is succeeded by marks of impaired energy, while the inflammation of the skin and cellular tissue is followed by suppuration and sloughing; and these destructive processes not unfrequently extend over the greater portion of a limb, purulent matter being infiltrated through

the subcutaneous cellular tissue. There is no outlet for the matter unless by sloughing of the skin. Under these circumstances, the practice of making incisions into the diseased parts has been recommended. This plan was suggested many years ago by various writers on surgery, but first practised in this country by Mr. Copland Hutchison. In his *Practical Observations on Surgery*, he recommends these incisions to be made about an inch and a half in length, from two to four inches apart, and varied in number from four to eighteen, according to the extent of surface the disease is found to occupy.

From these incisions fifteen to twenty ounces of blood will generally flow, relieving the tension of the skin, and at the same time giving exit to the pus.

Mr. Lawrence* recommends, in preference to these numerous incisions, one or two long incisions carried through the middle of the inflamed part, in a direction parallel to the long axis of the limb. "These incisions," he says, "are followed very quickly, and sometimes almost instantaneously, by relief and cessation of the pain and tension; and the alleviation of the local suffering is accompanied by a corresponding interruption of the inflammation, whether it be in the stage of effusion, or in the more advanced period of suppuration and sloughing."

"The treatment by incisions," he adds, "is suited to various stages of the complaint; but it is employed to the greatest advantage at the beginning, since it prevents the further extension of inflammation, and the occurrence of suppuration and sloughing. At a more advanced period, the incisions limit the extent of suppuration and gangrene, and at a still later time they afford the readiest outlet for matter and sloughs, and facilitate the commencement and progress of granulation and cicatrization."

Mr. Lawrence does not advise incisions in erysipelas generally, but confines their employment to cases of the phlegmonous kind. This treatment, therefore, is more applicable to erysipelas of the limbs than to the disease when it occurs either on the face and scalp, or on the trunk.

After the incisions, warm fomentations should be applied till the bleeding has ceased; the part should then be enveloped in a warm bread poultice. If the surface of the wound do not discharge freely, it should be dressed, under the poultice, with lint thickly spread with resinous or some other stimulating ointment. When suppuration is established, the matter finds a free discharge at the incision, large portions of cellular membrane are thrown off; and when this process is finished, pressure by a bandage is very useful in promoting the healing process.

Though the bleeding, which takes place from the incisions, is generally serviceable in arresting the inflammatory process, it should

not be checked so long as the pulse is unaffected. The following passage from Mr. Lawrence's paper contains a valuable practical caution. "The great extent to which the hemorrhage may proceed, renders it necessary that we should act very cautiously, especially in elderly persons, or in those whose strength is already impaired by the disease or previous treatment. The patient should be closely watched in such cases until the bleeding has ceased. Should it become necessary to stop the further loss of blood, this may be readily accomplished by tying any bleeding vessels, or placing the limb in an elevated position, or by pressure."

It will be necessary in most instances to allow nutritious diet, and sometimes a little wine to support the powers under the process of suppuration and granulation. We have occasionally found it necessary to give wine and even brandy immediately after the incisions, when the patient has been exhausted by the hemorrhage; but stimulants should be withdrawn after the powers have been restored.

Further experience has confirmed the efficacy of this mode of treatment in cases of phlegmonous erysipelas, and were testimony in support of the practice required, several instances which have been treated by incisions under the directions of the writer of this article might be adduced.

In some cases of erysipelas the accompanying fever is attended with symptoms of gastric irritation; the patient feels hot and flushed; the tongue is red at the point and margin, the body of it being coated with yellow moist fur; there is a bitter taste in the mouth, often accompanied with vomiting of bilious fluid, or diarrhoea.

If the pulse be full, and the general aspect of the symptoms denote acute fever, venesection and leeches to the epigastrium will, in general, quiet the gastric irritation, and relieve at the same time the local inflammation.

3. In the cedematous form of erysipelas the local disease is certainly inflammatory; but the constitutional excitement is seldom such as to warrant those depleting measures which are necessary in the more acute forms. Mild aperients, confinement to the horizontal posture, warm fomentations to the affected parts, and a restricted regimen, comprise all that is in general necessary in the treatment of cedematous erysipelas in its early stage. If the skin of the affected parts feel hot and painful, the application of leeches will be serviceable. Towards the decline of the disease, tonics, especially the sulphate of quinine, with a mild nutritious diet, will be useful.

When erysipelas terminates in gangrene, bark, wine, and opium, with the occasional exhibition of mild aperients, are to be exhibited according to circumstances.

4. In infantile erysipelas, the child's strength should be supported by means of a good nurse. If the milk of the mother be not sufficient,

* Med. Chir. Trans. vol. xiv.

a wet nurse must be procured, and cordials, such as white wine whey, small doses of quinine, and sometimes of ammonia, administered.

5. The tendency of erysipelas to become erratic, or to migrate from one part of the surface to another, has been pointed out. We have also alluded to cases in which the inflammation, after suddenly leaving the skin, has been followed by inflammation of some internal part. When this happens, the organ which has become diseased is to be treated on the same principles as when this inflammation occurs from other causes, while sinapisms are applied to those parts of the skin from which the erysipelas has receded. It is therefore necessary, in all cases of erratic erysipelas, to watch the condition of the internal organs, and to treat with promptitude and decision the symptoms of internal inflammation on their first approach, always however keeping in view the general powers of the patient.

6. When erysipelas supervenes on convalescence from other diseases, the treatment must be regulated according to the circumstances of the case. When it attacks convalescents from fever, it always retards, if it do not render the recovery doubtful. We have seen great benefit in such cases from abstracting blood on the very first appearance of the redness, by making numerous punctures with the lancet, and promoting the bleeding by warm fomentations. In several instances, this practice has at once put a stop to the disease. When it has proceeded after this local bleeding, a cooling plan of treatment with moderate support in cases of great debility, should be prescribed. In elderly persons stimulants, such as sulphate of quinine, ammonia, with wine and cordials, are often necessary.

Some continental surgeons have recommended the application of vesicants and escharotics as local remedies in erysipelas. Dupuytren employs blisters to the affected portions of skin in the second stage of phlegmonous erysipelas. M. Larrey reports favourably of the efficacy of slight cauterization of the surface in traumatic erysipelas.

Mr. Higginbottom, of Nottingham, more recently, has recommended the application of nitrate of silver, with the view of arresting the spreading of erysipelatous inflammation. He conceives that the influence of this remedy (as an external application) is not confined to the textures constituting the skin, but that it extends to the cellular substance, and even to the parts more deeply seated. This remedy is not to supersede active treatment when necessary. It is to be applied in the following manner. The part is to be first washed with soap and water to remove any oily substance from the skin, and afterwards wiped dry; the inflamed and surrounding skin is to be then moistened, taking care that not only every part of the inflamed skin be touched, but the surrounding healthy skin to the extent of an inch or more beyond it. The nitrate of silver is to be passed over

these surfaces once, twice, thrice, in common cases, and more frequently if rapid vesication be required. After the application, the part is to be exposed to the air to dry, and is to be kept cool. Mr. Higginbottom has given, in his work, several cases illustrative of the efficacy of this plan of treatment.*

Compression by a well applied bandage has been employed in the later stages of erysipelas. From what we have witnessed, we are by no means inclined to advise this mode of treatment. If inflammation of the skin and cellular tissue still remain, pressure must prove most injurious; and if there be infiltration of pus in the cellular tissue, it can be of no avail. We have seen more than one case of erysipelas, in which gangrene was induced within twelve hours after a bandage was applied. The only form in which it can be at all admissible, is in the suppurative stage of phlegmonous erysipelas as already recommended, and in the chronic stage of œdematous erysipelas after the inflammation has disappeared from the skin, when the limb continues enlarged from œdematous effusion into the cellular tissue.

(A. Tweedie.)

ERYTHEMA, (from the Greek *ἐρυθμα*, redness,) is one of those nosological terms which has been made use of in various significations by different writers, and its application is, even at the present moment, in some degree vague and arbitrary.

Hippocrates used it in the general sense of a morbid redness of the skin of any kind, for which, at a later period, Celsus, and after him Galen, substituted the term erysipelas; and hence, perhaps, arose a good part of the confusion which we meet with in the subsequent application of the terms. In the system of Sauvages, erythema is synonymous with idiopathic erysipelas. Cullen says, "when the disease is an affection of the skin alone, and very little of the whole system, or when the affection of the system is only symptomatic of the external inflammation," it is erythema; "but when the external inflammation is an exanthema and symptomatic of an affection of the whole system," he calls it erysipelas; and with this Mason Good nearly coincides, applying the former appellation to a local cutaneous inflammation tending to vesication, and the latter to an idiopathic fever producing an erythematic efflorescence. Callisen implies by erythema the lowest degree of erysipelas; and with Rostan, in like manner, it means this same disease in its simplest form. J. P. Frank, however, employs it in a very different signification, confining its use to a morbid redness of the skin of a chronic nature; but in this he is peculiar; at least it is not the sense in which it has been employed by the majority of his countrymen. In Germany, indeed, it

* An Essay on the Use of Nitrate of Silver in the Cure of Inflammation, Wounds, and Ulcers, by John Higginbottom.

seems for the most part to have been confounded, along with some other cutaneous affections, under the common head of erysipelas,* till Rust† restrained the use of the term erysipelas to that species of cutaneous efflorescence which is accompanied with fever, and dependent on disorders of the digestive organs, and drew a line of distinction between this and a similar-looking inflammation of the skin, originating in some local irritation (as excess of cold or heat, chemical agents, or slight wounds,) or in a morbid state of some of the subjacent structures, (as inflammation of membranous expansions, metastatic depositions into the cellular membrane, periosteum, or glands, &c.) This latter affection, whether idiopathic or symptomatic, Rust has distinguished by the appellation pseudo-erysipelas, and it evidently coincides very nearly with the "erythematic inflammation" of many medical and surgical writers in our own country.

In Willan's arrangement erythema signifies "a nearly continuous redness of some portion of the skin attended with disorder of the constitution, but not contagious;" to which Bateman adds, "it differs from erysipelas inasmuch as it is a mere rash or efflorescence, and is not accompanied by any swelling, vesication, or regular fever."

Rayer defines it to be a superficial inflammation of the skin, characterised by morbid redness and heat, and the absence for the most part of papulæ, vesicles, and pustules; and in his latest work he says it is the first stage of a number of cutaneous affections, but when permanent it constitutes in itself a distinct disease; and Billard adds, that as it often ushers in other cutaneous diseases, so it occasionally also forms their termination. Rayer thinks Bateman has fallen into an error in attributing such formidable symptoms as he does to some of his varieties of erythema, as they ought to be referred, not to this trivial inflammation, which is in itself productive of no danger, but to the coexistence of internal affections, chiefly inflammations of the mucous membrane of the stomach and intestines. These, which not unfrequently complicate it, have, he asserts, been overlooked by our English pathologist. The accusation, however, does not appear to us altogether well founded, as Bateman sets out by saying that erythema, like roseola, is commonly only a secondary affection—a mere symptom, though often the most prominent one, of dyspepsia, disorder of the bowels, and other internal derangements.

Having thus past in review most of the significations which have at various times been attached to the term erythema, we have only to add, that the sense into which it has gradually been subsiding in these countries, and in which we mean to employ it here, is that of a superficial inflammation of the skin, which is red and occasionally hot and itchy, but without vesication or obvious swelling. We shall adopt

the primary subdivisions of this affection which have been employed by Rayer, viz. into idiopathic and symptomatic, as at once more comprehensive and more practical than those of Willan and Bateman, all of whose six varieties are easily reducible to the second of the above heads. In reference to treatment, the division into acute and chronic is also most important, and should never be lost sight of in the management of an individual case.

Idiopathic or local erythema is often traceable to some obvious cause of topical irritation, as friction or pressure, extremes of heat or cold, the stings of insects, chemical irritants, distention of the integuments, or, finally, to the inflammation excited on the surface of the neighbouring skin by the existence of some papular, vesicular, or pustular eruption, or by wounds, ulcers, &c.

Of erythema induced by friction (intertrigo), we have a familiar example in that chafing of the skin which occurs especially in fat persons who are inattentive to personal cleanliness. The parts where it usually takes place are about the axillæ, groins, inner and upper part of the thighs, and in the cleft of the nates. It depends on the attrition of the contiguous surfaces in these situations, where the skin is of a delicate texture, and where there is considerable moisture or sebaceous secretion, and much movement of the parts. It very often makes its appearance behind the ears of infants, as well as in the folds of the neck, about the pudenda, back of the knees, &c. The irritated parts secrete in abundance a pale viscid fluid, even before they are excoriated or ulcerated, which concretes into scabs, and seems to be a modification of the secretion of the sebaceous follicles which are very much developed in infants at birth. The itching and irritation of intertrigo in young children is occasionally so considerable as to interfere materially with their rest.

Where the redness is intense, and confined to the circumference of the anus, and a considerable diarrhœa coexists, we may generally consider it as the result of this affection, and produced either by an extension of the inflammation of the mucous membrane of the rectum to the adjacent skin, or by the repeated application of discharges of an unnatural and stimulating quality. A similar irritation and redness occasionally occurs in a chronic form about the verge of the rectum in adults. It is accompanied with distressing itching, and seems for the most part to be connected with deranged action of the stomach and bowels. As it is often accompanied by a copious secretion, which concretes into scales, it is probably more closely allied to eczema than to the subject of the present article, though in many cases it is very doubtful to which it should be referred. (See ECZEMA.) When the redness about the anus and genitals of infants is of a somewhat coppery or livid hue, and resists frequent ablutions and the other simple means usually employed by nurses, we must investigate the case accurately, and ascertain whether the pa-

* Rose, Rothlauf, &c.

† Magazin für d. ges. heilkunde. b. viii.

rents or nurse labour under the suspicion of syphilis in any of its forms.

Erythema often makes its appearance on the cheeks of infants during the period of dentition, and in the neighbourhood of the umbilicus while the chord is sloughing off.

Of the erythematous redness induced by pressure we have familiar examples in the effects of a tight shoe,—of a long ride on one unaccustomed to it,—of protracted confinement to bed and constant lying on the same points of the body. (E. Paratrima of Sauvages.)

Of that caused by extremes of temperature we have instances in the redness of chilblains, and of slight burns and scalds.

The chemical irritants capable of inducing it are numberless. Ammoniacal and other stimulating liniments, blisters, pitch-plasters, sinapisms, turpentine, washes containing lead, and even the long-continued application of linseed poultices, occasionally produce this eruption in very irritable skins. In many instances, however, the presence of vesicles may be detected, and such cases will fall under the head of eczema. The long-continued or repeated application of the urine which occurs in certain diseases of the bladder and urethra; of the fæces in dysentery; or of both, in young infants who are not kept with a sufficient attention to cleanliness; as also the contact of gonorrhœal, leucorrhœal, and other morbid discharges, are frequent causes of this affection of the skin: even the long retention of the natural secretion of the sebaceous follicles around the corona glandis, by becoming rancid and acquiring irritating qualities, may give rise to this inflammation in the prepuce.

We have examples of the influence of distention of the skin in producing erythema, in the redness which sometimes manifests itself over the surface of the most prominent part of tumours, aneurismal and others, of rapid growth; and to this distention may, perhaps, be referred in part the blush of redness which indicates to the surgeon the existence of deep-seated matter, the inflammation of tendinous fasciæ, periosteum, &c.; though, doubtless, much of this depends on sympathy of the vessels of the skin with those of the subjacent parts. The red lines which occur over the track of inflamed absorbents and veins are of a similar nature, as well as the diffused blush over a joint suffering from acute rheumatism or gout. To distention, too, we must attribute the superficial inflammation which so often attacks dropsical parts, especially the lower extremities and scrotum, the skin being put greatly on the stretch by the serous effusion into the cellular membrane. As the anasarca declines, this usually terminates in extensive desquamation of the cuticle; but in less favourable cases, especially in elderly and intemperate people, whose constitutions are exhausted by violent or long-continued diseases of the chest or abdomen, the efflorescence often assumes a dark red or livid hue, and gangrenous ulcers ensue; a termination which is sometimes accelerated by the injudicious use

of scarification, or by an improper mode of performing this operation. In those cases where it is desirable to drain off the water in anasarca, punctures with a lancet are, as Mr. Pott long since pointed out, much preferable to incisions, as they are equally effectual in giving passage to the fluid, and are much less likely to inflame or become gangrenous,—a result which there is so much reason to dread in dropsical habits. Pott gives three cases in which the whole integuments of the penis and scrotum, which were greatly distended by serous infiltration, sloughed off, in consequence of incisions instead of punctures having been made into the swollen parts. M. Fouquier finds that gangrenous inflammation is least apt to ensue when the punctures have been made deep, by plunging the lancet quite through the skin and freely into the cellular membrane. The greater safety of this proceeding may, perhaps, be ascribed to its being more effectual in draining off the water, and thus more rapidly relaxing the integuments, and relieving that state of tension which predisposes to inflammatory action. It has lately been recommended by Dr. Marsh to perforate the anasarcaous swelling in several points with a cataract needle, after which the serum will continue for many days to exude abundantly, and from the smallness of the wound inflicted the risk of inflammation will be much diminished.

Of the erythematous redness induced by the irritation of vesicular, papular, and pustular eruptions, we see frequent examples. Thus the areola of the vaccine vesicle sometimes extends to a considerable distance, so as to cover the greater part of the arm, and in some rare cases even the breast, back, neck, and face. When so extensive, it has usually been described as a species of erysipelas, and is accompanied with a considerable degree of stiffness and difficulty in the motion of the parts affected, with some feverishness and occasional enlargement of the axillary glands. It has been known to turn livid, and has then been sometimes attended with fatal debility. Bateman, we are aware, has classed this affection under roseola. We are not desirous of displacing it, but rest content with pointing out its affinity to the genus under consideration, to which by its origin, apparently from the local irritation of the skin, and by its spreading in a continuous manner, it seems to be very closely allied. Indeed, no very accurate line of distinction is drawn by Bateman between roseola and erythema; and Plumbe has treated of them both together as mere symptoms of internal or constitutional disorder. According to Rayer the inflammation of erythema is of a deeper red and more pronounced character than that of roseola, and sometimes extends to the cellular membrane, or becomes chronic, neither of which is ever the case in the latter. The spots are moreover generally larger, but less numerous than in roseola, in which last they often occur simultaneously in almost every part of the body. After all, we think that these affections graduate insensibly into one another, and

that innumerable cases present themselves in practice which are equally referable to either.

The extensive redness which accompanies some species of strophulus and lichen exemplifies the connection of erythema with a papular disease.

One species of acne (*gutta rosea*) is usually complicated with a diffuse redness, which is of so striking a character as to have led Frank, though incorrectly, to class this pustulo-tubercular affection under the head of erythema. The affected parts of the face, in addition to the characteristic suppurating tubercles, present a shining redness, and occasionally an irregular granulated surface, generally commencing at the point of the nose and spreading gradually to the neighbouring part of the cheeks, and frequently attacking also the forehead and chin. After some years the skin assumes a rough and thickened appearance, and is traversed by a net-work of enlarged veins. It seems often to depend on derangement of the digestive organs, and a peculiar irritability of the stomach in particular; but these are rarely so well marked or so clearly characterised as to enable us accurately to discriminate, or to justify us in attempting to separate, in our classification, the symptomatic from the strictly local examples of this affection. The vividness of the colour of the eruption is greatly increased immediately after making use of any warm or stimulant food or drink, sitting opposite a hot fire, long-continued exposure of the face to the sun's rays, violent exercise, much stooping, reading or writing soon after meals, straining the eyes on minute objects, derangement of the stomach, constipation, or in fine, any of those causes which produce a temporary determination of blood to the head. In young persons who inherit this complaint, it appears in the form of red patches of an irregular shape on the face, from which scurfy exfoliations of cuticle take place from time to time, but the tubercles do not usually appear till a later period. Unless, however, there is a very decided hereditary predisposition to it, or habitual intemperance, it does not usually shew itself till middle life. As the person advances in age, the nose becomes swollen and of a fiery red, the nostrils dilated, and the skin assumes a lobular or tuberculated aspect, with considerable development of the sebaceous follicles which abound in this part. In a case in St. Bartholomew's Hospital in which the nose had from this cause a very unreasonable and inconvenient magnitude, we witnessed the removal of a portion of it by the knife, with considerable improvement to the physiognomy.

According to Frank's definition of erythema, which seems to be entirely drawn from the affection which we have just described, it is a superficial, habitually recurring, or permanent chronic redness of the skin, which grows pale on pressure, and is attended with a sense of itching, heat, and tension, with little real tumefaction or tendency to suppuration. He adds that it may be either smooth or studded with tubercles, and is very frequently accom-

panied with a furfuraceous exfoliation of the cuticle, and he points out the legs and face as its most frequent situation. As long as it is not repelled from the surface, he considers it usually unimportant. The skin becomes thickened, hardened, and deformed by its frequent recurrence. With many it continues throughout life, and with others returns almost periodically, without any evident lesion of other functions of the body. On desquamating, it leaves the skin in a state of increased sensibility, and prone to subsequent attacks. Its causes, he conceives, differ little from those of erysipelas, save in degree and permanence. The passionate, intemperate, and feeble are most liable to it, and suppression of the menses, of hemorrhoids, or of an habitual perspiration in the feet or axillæ occasionally give rise to it.

In the case of irritable wounds, leech-bites, ulcers, issues, setons, and blisters long kept open, the inflammation frequently extends from them to the surrounding skin, and manifests itself by a blush of redness which disappears on pressure. This, when accompanied neither by obvious tumefaction nor tendency to vesication, we should class under the head of erythematous inflammation, rather than under the formidable name of erysipelas, which is frequently bestowed upon it. In a practical point of view, it is desirable that an affection of so slight a nature and requiring so little treatment should have a distinct and appropriate appellation.

Into that species of erythematous efflorescence accompanied with a boggy intumescence of the subjacent cellular membrane, which occasionally supervenes upon wounds received in dissection, we do not mean to enter here, as the dangerous affection of which it is but one out of many more formidable symptoms, will be treated of in another place.

The disease which has been described by some writers under the name of *erythema mercuriale* is a vesicular disease, and will therefore be found under the head of ECZEMA.

The treatment of idiopathic erythema is generally simple. That arising from the chafing of contiguous surfaces may be prevented, for the most part, by assiduous attention to cleanliness, frequent washing with cold water, and the occasional use of the tepid bath. If excoriation has been already induced, emollient applications, as decoction of bran or of marsh-mallows, or a simple ointment, will generally suffice for its cure. In some individuals, however, ointments and greasy applications generally prove irritating, causing an increase of inflammation, and promoting suppurative of the denuded surface. When the part is very painful and considerably inflamed, a solution of the nitrate of silver affords one of the most healing, and after the momentary suffering immediately ensuing upon its use is over, one of the most soothing applications. Fat persons who have been in a state of torture after a long walk, or a hard day's shooting, have often found instant relief from this remedy,

Keeping the part constantly wet with Goulard's lotion is also very effectual.

The intertrigo occurring behind the ears in infants generally requires little more than scrupulous attention to cleanliness, and the interposition of a singed rag to absorb moisture. Such sores as form in this situation, if kept constantly moistened with a weak solution of the acetate of lead, will usually heal rapidly. Most authors, however, caution us against drying them up, dreading from such imprudence the occurrence of ophthalmia, inflammations of the brain, stomach, or intestines, or some other serious complaint; but by taking care to induce a somewhat freer state of the bowels whilst healing these sores, and by slightly reducing the quantity of the child's food, we shall probably in most instances obviate all dangers from this source. In all cases, however, we should endeavour, by attention to cleanliness, to prevent the affection ever going so far that either its existence should be productive of much inconvenience, or its removal of much risk. The advocates of the prophylactic virtues of such sores should be made aware that they often become in themselves, from their painfulness and fetor, and the swelling of the cervical glands which they induce, very troublesome ailments; and that they have even, in some cases, been known to prove fatal by the extension of the inflammation to the internal ear, and to the brain. The sores, too, occasionally become livid and gangrenous, and the child sinks even before the sloughs have separated—a termination which has been mentioned by Burns, who in such cases dwells on the necessity of directing all our efforts to supporting the strength, regulating the bowels, and counteracting the tendency to mortification by the application of camphorated spirits, the fermenting poultice, &c.

Where intertrigo makes its appearance in the folds of the neck, about the arm-pits, groins, or hams, daily bathing, and the occasional exposure of the parts to the air, together with sprinkling them with some unirritating absorbent powder, as tutty, levigated chalk or starch, is all that is usually necessary. Chausier and Plenck caution us against the use of ceruse (carbonate of lead), as being sometimes productive of pains in the abdomen, paralysis of the hands, and all the other symptoms of lead cholic. Yet it is still not unfrequently employed in this country, and we are surprised to find it recommended by J. P. Frank, Mason Good, and Burns, as one of the best preparations for dusting excoriations in children. A lotion containing the sulphate of zinc, and a weak spirituous wash, are often useful applications.

The erythematous inflammation induced by pressure will generally cease on the removal of the cause. Where it occurs from lying long on the same parts, as often takes place in tedious fevers, in phthisis, and in those who are bedridden from other chronic disease, a change of posture, if possible, or the judicious application of pillows, so as to take the

weight of the body off the prominent and inflamed points, are obvious modes of relief. Protecting the skin by chamois leather, soap-plaster, gold-beater's leaf, or white of egg coagulated by alcohol, are expedients to which we are obliged to have recourse when the posture cannot be changed. In low fevers the cutaneous vessels partake of the general debility of the system, and like other weak and irritable parts are readily excited to inflammatory action by the stimulus of pressure. Camphorated and spirituous washes seem, when early applied, to have considerable effect in hardening the skin, supporting the tone of its vessels, and enabling them to resist the influence of the above cause.

The treatment of the erythematous inflammation induced by extremes of temperature is to be found in all systematic surgical works.

The redness ensuing upon the sting of an insect is generally so transitory and trifling as not to require any medical aid. After the extraction of the sting, the application of olive oil with opium and ammonia are amongst the most effectual means of giving relief. The efficacy of ammonia is, probably, in some degree attributable to its chemical action, as the irritating fluid introduced by the sting is generally, as Tiedemann has observed, of an acid quality. A great share of its influence is also, no doubt, ascribable to its changing the mode of the sensibility in the irritated parts.

That species of erythematous efflorescence which is brought on by the application of chemical agents to the skin, usually ceases speedily after their application has been omitted; and its disappearance may be accelerated by emollients, fomentations, and other measures, which at once tend to remove all remains of the irritating substance, and to relax and soothe the excited skin. Where the irritating matter is of a resinous nature, oily applications will greatly facilitate its removal.

When the contact of urine and faeces is the source of the evil, frequent changes of linen are indispensable, and every effort should be made to keep the parts clean and dry. The detail of the expedients which have been devised for the fulfilment of this object is to be found in such works as treat of diseases and injuries of the bladder, urethra, &c.

When erythema results from the distention of the skin by tumours of rapid growth, relaxant applications under some circumstances, and the application of leeches and cold under others, are called for; but as such cases usually fall under the care of the surgeon, we shall not dwell on them here. Where this inflammation is induced by anasarca distention, a horizontal posture is very important, and frequent fomentations, and keeping the limbs enveloped night and day in lint moistened with water, and the whole wrapped up in oiled silk, so as to prevent too rapid evaporation, are measures which tend notably to diminish tension by keeping the skin in a relaxed and perspirable state, and which have likewise great influence in subduing local inflammation. When the

inflamed surface assumes somewhat of a livid or brownish hue, and threatens gangrene, the use of dilute spirituous and camphorated fomentations is the common practice, though the propriety of it is not universally acknowledged. Those who look upon inflammation as the source of all the danger, prefer soothing applications throughout. Whilst using these local measures, we must at the same time endeavour to promote the absorption of the effused fluid, support the strength, and combat disease of the heart, lungs, serous or mucous membranes, which so often co-exists in these cases, and as being the principal cause of all the other symptoms, demands our chief attention.

When the irritation of some papular, vesicular, or pustular disease seems to be the exciting cause of erythema, the latter may generally be disregarded, provided we take the proper steps for relieving the primary affection, and these will probably for the most part be found in the due employment of soothing or antiphlogistic measures. In that species which so often complicates acne, where it is constitutional, a cure need hardly ever be expected, as it seems to depend in some degree on a varicose state of the minute veins. Cold evaporating and slightly astringent lotions, with moderate but long continued pressure, are almost the only measures which afford permanent benefit in varicose affections of the smaller veins in other parts of the body; but they are, if not wholly inapplicable in this situation, at least too inconvenient to give them any chance of being steadily and long enough employed. Very great temperance, regular exercise, and avoidance of all those causes which we have pointed out as tending to exasperate this affection, should be strongly enjoined. Where the scurfiness is considerable, some mild ointment is useful in removing or concealing it. If the affection be purely local, slightly astringent lotions of lead or zinc, with a small portion of alcohol or vinegar, may be tried, or ointments of a similar nature; but they will too often prove nugatory in their effects. The popular use of water-cresses and other raw vegetable matter, under the name of antiscorbutics, is highly irrational. A somewhat tonic regimen, and the use of flesh-meat in preference to an exclusively vegetable diet, are proper. We have lately met with a striking exemplification of this in the case of a distinguished artist, in whom this affection, induced by the habitual stooping which the exercise of his profession required, was greatly and suddenly aggravated by a strict adherence to a vegetable diet, and again diminished considerably on his returning to the free use of flesh-meat. The distention and acidity of stomach which an excess of vegetable food often induces, assist us in explaining its injurious effects in such cases. Where the eruption depends upon some chronic derangement of the digestive organs and an irritable state of the stomach, little can be expected from topical applications. Stimulants (and most of the empirical lotions for this

affection contain corrosive sublimate, and are of this nature,) are usually injurious, and to remove this efflorescence by astringents, where possible, might do much mischief, by exasperating the internal disorders from which they spring. Alkalies internally seem sometimes useful, which is attributable, probably, to their antacid power, and their directly soothing effects on the mucous membrane. The regulation of the functions of the stomach, bowels, and liver, with a careful attention to the diet, are the most important points in endeavouring to prevent its increase.

The redness of the skin which is occasionally induced by inflamed ulcers, leech-bites, painful issues, &c., in addition to such internal antiphlogistic means as the existing state of the system may appear to indicate, requires locally merely the application of a bread-and-water poultice, or of lint, moistened with cold water and enveloped, as directed above, in oiled silk, to prevent its drying rapidly by evaporation. The erythematic inflammation succeeding to the use of leeches seems often to be induced, not so much by the irritation of the wounds they inflict, as by that excited in them by the subsequent application of Goulard and other astringent tonics. Where it is necessary to apply cold to a part immediately after leeches have fallen off, by confining ourselves simply to the use of cold water, in preference to these medicated lotions, we shall rarely have the mortification of seeing this cutaneous affection, which is often very annoying to the patient and his attendant, ensue; whilst, at the same time, the temperature may, by means of the coldness of the water and its gradual evaporation, be regulated quite as effectually.

Symptomatic erythema is associated with many inflammatory affections, especially those of the mucous membrane of the stomach and intestines; and the symptoms which have been by some attributed to the cutaneous affection are really, as well as itself, dependent on the state of the internal organs. The measly efflorescence so common in our continued fevers of some years, is a striking example of the sympathy of the cutaneous system with the mucous membrane. In dysentery, too, exanthematous efflorescences occasionally occur, and sometimes, according to Chomel, form a salutary crisis to the disease.

The erythema of Willan and Bateman, of which we have already given the definition, nearly coincides with Rayer's erythema symptomaticum, and has been divided into six varieties. In some of these the eruption is more or less elevated at some period of the course, thus slightly approximating them to the papular and tubercular classes; but these elevations are obscure and soon subside. Willan has, however, availed himself of their temporary existence to form the ground-work of some of his subdivisions.

1. *Erythema fugax* (maculæ volatiles) consists of evanescent red patches of an irregular figure, which appear successively on the breast, neck, arms, and face in various febrile dis-

orders, in bilious diarrhœa, in chronic affections of the primæ viæ, dyspepsia, hysteria, &c. The heat of the affected skin is increased, and the disappearance of the patches is not accompanied with any evident desquamation.

2. *Erythema laxe* of Bateman coincides almost, if not altogether, with the species which we have already described as depending on dropsical distention. He dwells on the usual coexistence of anasarca, on the smooth shining surface, its appearance chiefly on the lower extremities, and its termination in desquamation, and says it may occur either in sedentary young persons, in whom exercise, diuretics, and corroborants will contribute to shorten its duration, or also in elderly or anasarca subjects, especially if intemperate, and is liable to terminate in gangrenous ulcers. The distended skin is often chequered with patches of a dark red or purple hue. Horizontal posture, diuretics and bark, with weak spirituous lotions, are recommended by him. He adds, that it sometimes occurs without œdema where the bowels have been much disordered, and occasionally is worse at the menstrual period.

3. *Erythema marginatum* occurs chiefly in old people on the loins and extremities in the form of patches, which are in some places obscurely papulated, and are bounded on one side by a hard, elevated, tortuous, red border, but are not regularly defined on their open side. They have an uncertain duration, and are not productive of any irritation in the skin. They are connected with some internal disorder, and are usually an unfavourable symptom.

4. *Erythema papulatum* consists of large, vivid, red, irregular patches, chiefly on the arms, neck, and breast, generally preceded for a day or two by obscure papulæ, which give a roughness to the skin. The eruption, after continuing about a fortnight, becomes bluish, especially in the centre of the patches, and gradually declines. There is occasionally, though not always, considerable constitutional disturbance, indicated by a small frequent pulse, anorexia, and great depression, with severe pain and tenderness of the limbs. The treatment consists in light diet, diaphoretics, the mineral acids, and attention to the state of the bowels.

5. *Erythema tuberculatum* occurs, like the preceding, in large irregular red patches, but through these small tumours are dispersed, subsiding in about a week, and leaving the erythema behind them, which, becoming livid, disappears in about a week more. It is usually ushered in by fever, and is accompanied with languor, irritability, and restlessness, and is succeeded by hectic. It is so rare, that Bateman himself never saw it, and Dr. Willan, on whose authority he gives it, met with but three cases, and medicine seemed to have no effect either in alleviating them or in warding off the subsequent hectic.

6. *Erythema nodosum* seems peculiar to females, and occurs chiefly about the shins. It is preceded by slight febrile symptoms,

which cease on its appearance. It presents itself in the form of oval patches, with their long axis parallel to the shin bone. They rise slowly into hard and painful protuberances, which gradually subside within nine or ten days, their colour about the same time turning bluish. It is a mild affection, requiring usually only laxatives, mineral acids, and other tonics. We have known it, however, return frequently in the same individual, attended with considerable œdema, and after terminating in desquamation, succeeded by severe pains in the limbs, which demanded the employment of pediluvia, bandages, &c.

To these six varieties mentioned by Willan and Bateman, we give a seventh, *general erythema*, on the authority of Rayer, who says it has been overlooked by most writers on cutaneous diseases, or confounded by them with erysipelas. It consists in a superficial redness of the skin unequally distributed over various parts of the body, and occasionally differing but slightly from the natural colour of the integuments, and unaccompanied by swelling or vesications. It is attended with heat and dryness of the surface, and its duration rarely exceeds a week. The redness may be continued or intermittent, or appear only momentarily, during the exacerbation of gastro-enteric or other acute internal inflammations. It often disappears on the approach of death. In those who recover, desquamation and falling out of the hair one or two weeks after the disappearance of the eruption, often occur.

This species, and, indeed, all cases where the erythema presents itself in an acute form, require antiphlogistic regimen, and occasionally venesection, with cooling and emollient lotions and the tepid bath.

In the chronic varieties of erythema, Rayer recommends leeches to be applied round the affected parts, together with tepid and vapour baths, or the douche impregnated with sulphuretted hydrogen. Where the cutaneous inflammation depends on some evident derangement in the stomach or intestines, the application of leeches in the neighbourhood of these organs may also be necessary.

(W. B. Joy.)

EXANTHEMATATA.—The word *exanthema*, derived from the Greek term ἐξάνθια, to *effloresce*, or *break forth*, was applied, by the Greek writers, to cutaneous eruptions generally. By modern authors its application is confined to cutaneous eruptions accompanied with fever, arising from specific contagion.

In the nosology of Cullen, the *exanthemata* constitute the third order of the class *Pyrexia*, and we find he has included ten different genera, viz. *variola*, *varicella*, *rubeola*, *scarlatina*, *pestis*, *erysipelas*, *miliaria*, *urticaria*, *pemphigus*, and *aphtha*. It is evident, however, he has included not only the eruptive fevers, strictly so called, but those diseases in which a vesicular efflorescence occasionally appears in their progress. Plenck, Frank, and others have fallen into a similar error. Willan and Bate-

man classify the exanthemata according as the eruption agrees with their definition of an exanthema or rash, viz. "superficial red patches, variously figured and diffused irregularly over the body, leaving interstices of a natural colour, and terminating in desquamation of the cuticle." They therefore comprehend, under exanthemata, *rubeola*, *scarlatina*, *urticaria*, *roseola*, *purpura*, and *erythema*.

In the article FEVER will be found the classification of fevers we propose to adopt in this work, viz. into 1. *continued*; 2. *periodic*; and 3. *eruptive*. The eruptive fevers comprehend those diseases which we submit should alone be included in the exanthemata, viz. *variola* (and its modifications), *rubeola*, and *scarlatina*. In those diseases which bear a strong analogy to continued fever, we find that a certain order of febrile symptoms is followed by a particular eruption; that the fever and exanthema run a definite course; the efflorescence going through a regular series of changes, and terminating in desquamation of the cuticle; that these eruptive fevers occur only once during the life of the individual; and, lastly, that they are communicated by contagion.

The regularity of the eruptive fever and the progress of the efflorescence are most precise. The eruption of *small-pox* appears on the third day from the commencement of the febrile indisposition, and matures on the tenth; the rash of *measles* appears on the fourth, and declines on the seventh day; and the efflorescence of *scarlatina* is visible on the second day, and begins to disappear on the fifth; the progress of the fever being thus fixed and regular, and apparently keeping pace with the series of changes which the eruption successively undergoes.

The circumstance that eruptive fevers occur only once in the course of life, though correct as a general rule, is liable to occasional exceptions. These, however, are comparatively so few, that they tend much to confirm this principle. Persons on the other hand occasionally escape one or other of the eruptive fevers; more frequently, however, *scarlatina* than either *small-pox* or *measles*.

The last characteristic of the exanthemata—that they are communicable by contagion—admits of positive proof as to *small-pox*, in the communication of this disease by inoculation.

Dr. Home* succeeded in communicating measles by introducing the blood of a patient affected with the disease into the system of another individual; and the evidence of the contagious nature of scarlet fever is so strong, that no one in the present day ventures to impugn the doctrine. (See MEASLES, SCARLATINA, SMALL POX, and VARICELLA.)

(A. Tweedie.)

EXPECTORANTS, (from *ex* and *pectus*; *expectoro*, *expectorans*, *Expectorantia*.) are medicines intended to promote the excretion of mucus and other substances from the

trachea, its branches, and the bronchial cells. In offering this definition, it is proper to mention that the existence of any substances capable of unloading the pulmonary tubes has been doubted; but experience has demonstrated that not only substances applied in the form of vapour or of gas to the parts now mentioned, promote expectoration, but that substances taken into the stomach produce the same effect.

The mucous membrane of the air-tubes of the lungs is the part intended to be influenced by expectorants. This membrane, which lines the whole of these tubes, from their origin, through their trunk, the trachea, and 'all its ramifications, to their termination in the bronchial cells, secretes a lubricating bland mucus, in appearance not unlike a thin solution of gum, intended to mitigate the action of the air on a highly irritable surface. When this mucus is accumulated, or becomes viscid and adheres to the sides of the bronchial tubes, or when it is inspissated or rendered acrid by inflammation excited in the membrane, so as to impede in any manner the function of respiration, then expectorants become useful by contributing to its removal. In effecting this, they operate in two distinct ways: 1. they either diminish the action which has produced the preternatural secretion, and thereby enable the natural effort of coughing to remove the morbid matter already existing in the air-tubes, or, 2. they directly operate on the respiratory nerves, and powerfully excite those muscles the sudden simultaneous action of which is necessary for expelling the morbid matter. It is easy to conceive in what manner gaseous substances introduced into the lungs may promote this expectorant effort; but the question naturally suggests itself, do the substances taken into the stomach proceed to the lungs, and there exert their influence?

Many substances, when introduced into the system through the stomach, escape by the lungs. Thus, various odorous matters, oil of turpentine, ether, alcohol, phosphorus, and camphor, soon after they are taken into the stomach, become perceptible in the breath; and this is the case, also, when they are introduced into the system by other channels. M. Breschet and Dr. Edwards having injected oil of turpentine, in small quantity, into the crural vein of a dog, found that it was soon afterwards strongly exhaled from the lungs, although no odour of it was perceived on exposing the peritoneum.* From these and other facts it is evident that the lungs afford exit to substances which have entered the circulation: now, in admitting this, it is not unreasonable to suppose that some of the medicines administered with the intention of promoting expectoration also enter the circulation, and proceeding to the lungs, excite there the expectorant effort. But, although this conclusion be highly probable, yet it must be admitted that it is not susceptible of demonstration.

* During this experiment, if a portion of the surface was denuded and a cupping-glass applied over it, the odour was not then perceptible in the breath.

* Clinical Experiments.

All expectorant substances may be arranged under two heads.—1. those which effect the excretion by *topical* means; 2. those which effect it by *general* means.

1. *Topical expectorants*.—These may operate in two ways: *a.* they may directly stimulate the nerves regulating the action of the respiratory muscles, and, by exciting these to sudden action, may effect the excretion by coughing; or, *b.* they may compress the thoracic viscera by producing vomiting, and thus induce a sudden and forcible expiratory effort so as to effect the expulsion of matters from the lungs.

a. In explaining the manner in which the first kind of topical expectorants operate, it may be useful to consider briefly the nature of coughing. The act of coughing is a short and forcible expiratory effort, frequently repeated, the inspirations, in the intervals, being trifling in comparison with the expirations. Any irritation affecting the glottis, and acting upon a branch of that series of nerves which supply the respiratory muscles, excites involuntary coughing; but the action thus excited may be moderated, if it cannot be wholly checked and terminated, by the will of the individual. Coughing, whether voluntary or involuntary, is the result of the irritation of a certain set of nerves, and is intended to relieve the bronchial system of some offending cause; it is, therefore, a salutary phenomenon. In those debilitated by disease or other causes, the difficulty of exciting the act of coughing with force sufficient to produce the salutary effect, is so obvious as to strike the ordinary as well as the professional observer. The distress arising from this circumstance, the uneasiness caused by the irritating matters which coughing forcibly would readily remove, and the feeling of suffocation experienced from the accumulation of mucus obstructing the free passage of the air to the bronchial cells, are very considerable. In such states of the chest, the topical application of a stimulant to the bronchial nerves may so far rouse the exhausted excitability as to enable the muscles to perform the necessary effort; whilst, at the same time, the substances employed to produce this effect may be of a nature to prove also beneficial, by imparting a renewed healthy action to the diseased mucous membrane. The whole of the substances, arranged under this head, it must be recollected, stimulate so much as to require the utmost caution in their administration; but as the atmospherical air is the vehicle by which they are conveyed into the lungs, there is no difficulty in apportioning the degree of dilution so as to regulate the quantity of stimulus required or admissible.

The substances employed for the purpose of stimulating the mucous membrane of the bronchial system by direct application, and through it stimulating the respiratory organs, are few, and of these a small proportion only are in use.

Benzoic acid may be employed either in its separate pure form or at the instant of its

extrication from benzoïn. In either case it requires to be largely diluted with atmospherical air, and combined with aqueous vapour. If the crystallized acid be employed, half a drachm should be put into an inhaler, and volatilized by the heat of a spirit-lamp; or, if the crude benzoïn be preferred, half an ounce of it should be broken into small morsels and treated in the same manner. In the first instance, the diluted acid is the stimulating agent; in the second, the volatile oil, mixed with a small portion of the acid, rises with the aqueous vapour. Both are said to have proved beneficial in phthisis, even after the existence of suppurating tubercles had been clearly ascertained. The writer of this article has never employed these stimulants in phthisis; but he has seen much advantage derived from them in spasmodic asthma, in shortening the paroxysm and promoting expectoration.

Acetic acid acts nearly in the same manner as the benzoic. It is the oldest of the topical remedies of this order, is more manageable than the acid of benzoïn, and does not require the aid of boiling water for its elevation. It is usually extricated from diluted vinegar; but as this contains sulphurous acid, distilled vinegar should be employed.

Chlorine is of very late introduction as a topical expectorant. It may be breathed by mixing it with the common air of the apartment of the patient, at the moment of its extrication from chloride of lime or of soda; or from a mixture of one part of peroxide of manganese and four parts of muriatic acid.* The former is to be preferred when a moderate stimulus only is required; but in general, for expectorant purposes, chlorine is obtained by expelling it from its saturated solution in water by the aid of gentle heat.

If an attempt be made to breathe chlorine in its undiluted state, it does not enter the lungs, but produces a powerful spasm of the glottis; and, if this be not immediately relaxed, suffocation ensues. When it is diluted with a moderate portion of air, it excites violent coughing, irritation in the bronchial cells, great dyspnoea, and a painful, anxious sensation in the chest, which continues for several days. When largely diluted it operates as a salutary stimulus to the mucous membrane.

In its largely diluted state, chlorine gas was first proposed as a topical expectorant

* In this process the muriatic acid, which is a compound of hydrogen and chlorine, is partially decomposed; and decomposition of the peroxide of manganese also takes place. The liberated hydrogen of the muriatic acid unites with one equivalent of the oxygen of the peroxide of manganese, and forms water; whilst the chlorine is set free in a gaseous state. This gas is of a greenish yellow colour, and has a pungent, acrid, suffocating odour. It is readily absorbed by water; but the solution, unless kept in a blackened bottle or a dark place, is changed in its character by slow decomposition of the water and the formation of chloric and muriatic acids. Its goodness is known by testing it with litmus paper: if good, it will destroy the colour of the paper; if it contain the above-mentioned acids, the paper will be reddened.

by Dr. Favart of Marseilles in 1804. Soon after that period the writer of this article became accidentally acquainted with its value as a topical expectorant, from witnessing its beneficial influence in a severe case of epidemic catarrh, when extricated as a fumigation to check infection; and he has employed it occasionally from that time in pulmonary diseases. But it was scarcely used either in this country or on the continent, until a report of Dr. Cottureau, of the Faculty of Medicine of Paris, again brought it before the profession. Several trading chemists, in particular M. Gannal, had remarked that phthical persons, who engaged themselves to work in the manufactories of bleaching liquor, in which chlorine is largely extricated, were gradually but evidently improved in health: to confirm his observations, M. Gannal constructed an instrument for inhaling it, and actually administered it as a remedy in phthisis. The success of his experiment surprised him; but not being a medical man, he mentioned his views of the subject to Dr. Cottureau, who pursued the same plans as M. Gannal, and with a degree of success sufficient to merit the attention of the profession. The same influence of chlorine in pulmonary diseases has been observed by Mr. Tenant, of Glasgow, who informs us that all the men who engage themselves to work in his manufactory, if they have coughs, are rapidly relieved when gradually introduced into the chlorine house; and of late, people labouring under phthisis and asthma have taken lodgings in the neighbourhood of his works, for the sake of the atmosphere of chlorine emanating from them.

The best method of inhaling chlorine is to put $f\text{3i}$ or $f\text{3ii}$ of the saturated aqueous solution into a glass inhaler, and to add to it $f\text{3ii}$ of hot water, which gradually drives off the chlorine. This quantity may be inhaled every five or six hours, so as to maintain the effect produced on the mucous membrane. When it is thus cautiously inhaled, the evident effects are a slight sensation of constriction in the thorax, with some increase of cough; in a few instances a trifling degree of vertigo has been experienced, but these feelings rapidly subside; expectoration is produced almost without an effort, and the patient gradually becomes more comfortable than before inhaling the gas. In cases of asthma the relief is peculiarly striking; and in phthisis we have observed that the symptoms of hectic have much abated during its employment; but we have seen no instance of the latter disease cured by it.

The beneficial operation of chlorine may depend on its stimulus producing a new action on the diseased surface, which, if it could be maintained for a sufficient length of time, might overcome the morbid action; and by supporting the tone of the system by other means, without exciting fever, the disease might be cured. In cases where large vomicae exist, it is in vain to expect a cure from any means; but if we reflect on the influence of chlorine in improving the discharge from diseased mucous

surfaces, such as that of the nostrils in coryza, and in promoting the cure of external ulceration, it is not a vain speculation to expect much advantage from its inhalation in phthisis.

When chlorine is inhaled without being sufficiently diluted, the irritating effects are only temporary: very few instances have occurred in which inflammation has supervened. Indeed to no other irritant gas does the pulmonary system so rapidly accommodate itself; the workmen in the manufactories of bleaching liquor breathe it daily in large quantities with impunity. The best method of overcoming its deleterious effects is to inhale ammonia largely diluted with aqueous vapour or ether; or, if neither of these be at hand, to inhale simple warm vapour.

The substances which operate topically, either by stimulating the pulmonary exhalents, or as sedatives relieving the constriction on these vessels, and thereby facilitating expectoration, are also few. In those unaccustomed to the use of the former, they undoubtedly excite coughing; but in such cases the spasmodic action is produced by their first impression on the glottis, for when they are admitted into the trachea, no coughing is produced. The first of these, the fumes of boiling tar, was recommended as a remedy in phthisis by Sir Alexander Crichton, who had seen it employed in Russia. It produces in general much increase of cough; but this soon abates, and the expectorated matter is, in most instances, much improved. These effects seemed to promise the most salutary results; but like some other remedies which have been occasionally introduced to the notice of the profession, the vapour of tar suffered from being overpraised, and from too sanguine expectations being formed relative to its powers, and it fell into neglect.

Another vapour which operates nearly in the same manner as that of tar has been much employed in America, the fumes arising from burning undressed wool. The use of these vapours was first recommended by Dr. Physick, who had found them extremely serviceable for stimulating and healing external sores, and concluded that they might prove equally beneficial if inhaled into the lungs. He conceived that he had established the fact of their utility in phthisis; but the experience of a few instances in which they were tried by the writer of this article does not authorize him to pronounce very favourably respecting their employment. They excited great coughing when they were first used; but this rapidly subsided, and some degree of comfort was certainly experienced after each time of inhaling them: but nothing more resulted from their employment.

The sedative topical expectorants are better known. Tobacco, when smoked, has been long employed for allaying the violence of the paroxysm in spasmodic asthma; but it is uncertain whether the benefit should be ascribed to the nicotina or the volatile oil. The use of stramonium, in the form of smoke also, has been found highly useful, and was at one time a favourite remedy in asthma. It appears

to produce its beneficial effect in two ways. In the first place, it is directly applied to the mucous membrane when this is in a state of great irritability, and by acting as a sedative and allaying this condition, it favours the slower and more perfect secretion of the mucus, which being thus brought into a more natural state is consequently more easily excreted: in the second place, by influencing generally the nervous system, the spasmodic symptoms attendant on the paroxysm of asthma are allayed, and respiration proceeds in a calm and undisturbed manner. The powers of stramonium were, at one time, greatly over-rated; but experience has sufficiently demonstrated that it is capable of mitigating the violence of the paroxysms, although it may not be able to establish permanent relief from their attacks. Dr. Bree has objected to the employment of stramonium on the supposition that it induces a tendency to apoplexy; but this is, at best, problematical.

b. The second set of topical expectorants, those which operate by mechanically compressing the thoracic viscera, and thus induce a sudden and forcible expiratory effort, so as to affect the expulsion of matters from the lungs, are emetic substances. In the operation of vomiting, by the sudden and violent contraction of the abdominal muscles, in order to force the contents of the stomach upwards, an impulse is communicated to the whole bronchial system, and by this means the expiratory effort being rendered more forcible, the expulsion of the mucus is effected. The beneficial effect of emetics in clearing away mucus accumulations from the lungs is indeed well known; and frequent recourse is had to them in many of the pulmonary diseases of children with uniform advantage. It might be supposed that the best emetics to select for expectorant purposes, would be those which operate by directly stimulating the nerves of the stomach, and which call the muscles necessary in the mechanism of vomiting into immediate action; but experience has demonstrated that the antimonial preparations are better suited for this purpose than any other emetics. Besides aiding the expulsion of mucus from the bronchial tubes, they possess the power also of controlling inflammatory action. The employment of emetics for procuring expectoration was formerly in much vogue as a remedy in phthisis. The emetics for this purpose, however, were seldom selected upon any principle: at one time we find sulphate of zinc and sulphate of copper employed; at another, antimonials, ipecacuanha, and other nauseating emetics. If the lungs be loaded with mucus, and little or no febrile action be present, the direct emetics are to be preferred; for in this case the mechanical impulse only is required; but if, in promoting expectoration, we are desirous of maintaining nausea afterwards, then the best emetic is the vinous solution of the tartrate of antimony and potassa, given to the extent of $\text{ʒ} \frac{3}{4}$ vi for a dose, in a solution of the extract of liquorice. Squill and sulphuret of potassa have also been employed to excite vomiting to aid their expectorant properties.

2. *General expectorants.*—These operate either by being received into the circulation, or through sympathy with the stomach: the first stimulate the pulmonary exhalents through the medium of the circulation; the second affect the excretories by the nausea which they induce.

a. The first of the *organic* substances which operate by stimulating the pulmonary exhalents is *emetina*, the active principle of ipecacuanha. In its uncombined state it has not been much employed in Britain; but in France it has been successfully administered in doses of one-eighth of a grain, three or four times a day, in whooping-cough; and in doses of a quarter of a grain it proves useful in catarrhal affections. It produces expectoration without exciting nausea; and we can readily comprehend how this is effected, if we admit that it is received into the circulation and determined to the lung as its emunctory: but if this be not admitted, it is difficult to explain its mode of acting:—its beneficial influence is undoubted. When ipecacuanha itself is administered, it is usefully combined with opium, in the form of Dover's powder, of which from three to five grains produce expectorant effects, when neither nausea nor diaphoresis result. The French physicians assert that ipecacuanha is less useful in pulmonary diseases than uncombined emetina, owing to a peculiar fatty matter which it contains interfering with the influence of the emetina. This opinion is merely hypothetical; but nevertheless the evidence which experience has afforded in favour of the expectorant power of emetina is sufficient to recommend it to the favourable notice of British practitioners.

The value of *squill* as an expectorant has been long known: it is supposed to depend on a peculiar principle which has been named *scillitina*. If this opinion be correct, it is probable that the squill undergoes decomposition in the stomach, and that the *scillitina* only is conveyed to the lungs. This opinion, however, is as yet unsupported by proof; and much obscurity still involves the mode in which squill produces its expectorant effect. Squill is contra-indicated in all diseases of an inflammatory type. It is usually administered in combination with honey and vinegar in the form of an oxymel, or in tincture, or as a pill in combination with soap and ammoniacum. In these forms it is prescribed with advantage in asthma and chronic catarrh. The dose should not exceed one grain of the dried bulb, as in larger doses it is apt to prove emetic, purgative, or diuretic: one drachm of the oxymel, seven grains of the pill, and thirty minims of the tincture, are equivalent to this quantity of the dried bulb. When overdosed, squill excites the most violent vomiting, purging, and convulsions, symptoms which induced Orfila to refer its operation to the nervous system; an opinion partly confirmed by the fact that dissections of persons poisoned by squill present no appearances of inflammatory action in the pulmonary system. The best antidotes are ammonia and the alkalies, on

which account these substances are incompatible in prescriptions with squill.

Several of the gum resins are generally regarded as useful expectorants, but the expectorant property of some of them is doubtful. *Myrrh* is one of these, and assuredly we have never seen it produce expectoration when given alone: conjoined with ipecacuanha or squill, it proves useful in the chronic coughs and catarrhal affections of debilitated habits; but in these cases more is due to its tonic than its expectorant influence. It is frequently prescribed with the view of supporting the system in the advanced stages of phthisis; and, probably, no medicine is better adapted for this purpose during a course of the inhalation of chlorine. At best, however, it can only be regarded as an auxiliary. In prescribing myrrh, it should be recollected that its aqueous infusion precipitates salts of lead, which are, consequently, incompatible in mixtures with it. In phthisis it is advantageously combined with sulphate of zinc or salts of iron; and when there is much acidity of stomach, it may be dissolved in liquor potassæ or ammoniæ, and administered in any bland fluid or aqueous solution, such, for instance, as the bitter almond emulsion. Its efficacy as an auxiliary is well established in chronic catarrh and humoral asthma, in both of which diseases its tonic influence is beneficial in relieving the exhaustion which follows the profuse expectoration. The dose of myrrh, in such cases, is from four to ten grains, repeated every third or fourth hour.

As an expectorant, *ammoniacum* has been found useful in asthma, peripneumonia notha, and the chronic catarrh of old age; it has also been prescribed in tubercular phthisis. It is seldom given alone, but usually in combination with squill or antimonials. In America it has lately been conjoined with nitric acid: two drachms of it are triturated with f^{ss} of nitric acid, and then formed into an emulsion with f^{ss} of water. A table-spoonful of this solution in a cupful of any bland fluid is administered every second or third hour, in cases of old catarrhs, when there is an infarction of the lungs with viscid mucus, which the patient has not strength to expectorate. It may, in this state, certainly rouse the energy of the respiratory muscles; but we doubt whether it is equal to ammonia or its carbonate in such cases. It may, however, be administered in conjunction with ammonia; and, when thus combined, no other expectorant produces so much benefit in those irritable coughs which accompany hysterical affections, and are attendant on dyspeptic and hypochondriacal conditions: the expectoration becomes freer and more abundant, the oppression diminishes, and the patient is rendered altogether more comfortable. *Ammoniacum*, Galen informs us, was employed by Crito as an expectorant in phthisis; it formed the chief ingredient of the pilulæ balsamicæ of Morton, which held at one time a high reputation; and many other writers have recom-

mended it in this merciless disease. It may prove useful in promoting expectoration where it is deficient, and may have a tendency to allay irritation; but the experience of modern practitioners has not confirmed the encomiums of their predecessors with respect to its value as a remedy in phthisis. The dose of *ammoniacum*, in these cases, is from eight to ten grains, administered three or four times a day. In large doses it causes nausea, thirst, and a sensation of heat at the stomach. The emulsion is the best form of administering *ammoniacum* as an expectorant; but as the gummy matter is not sufficient to suspend the resin for any length of time, it should be combined with mucilage. The dose of the mixture is from f^{ss} to f^{ss} : it is coagulated by the oxymels, and cannot be combined with spirit of nitrous ether.

Assafetida was regarded by Cullen as superior to *ammoniacum* in spasmodic asthma; and in phthisical cases, when there is much flatulency, Dr. Parr considers it valuable as combining cardiac and expectorant properties. It possesses, however, no advantages over *ammoniacum*, and is more heating: indeed, what has been said of *ammoniacum* applies equally to it, galbanum, and sagapenum; they are all stimulant expectorants, and may be administered, under similar circumstances, in the same doses and in the same manner.

The balsams employed as expectorants are those of *tolu* and *peru*, *styrax* and *benzoin*. All of them were formerly much used in affections of the chest, whether recent or chronic; but there can be only one opinion respecting the impropriety of administering balsams in inflammatory states of the lungs. Independently of the benzoic acid which they all contain, and which is powerfully stimulant, the volatile oil, which is another of their components, contra-indicates their administration in cases of excitement. Dr. Fothergill denounces the employment of balsams in pulmonary diseases at any period of the attacks, but he carried his objections too far; and there is sufficient evidence to prove, that after the excitement is subdued, there are circumstances which not only admit of the administration of balsams, but in which they have been found highly beneficial. They are best administered in the form of emulsion, made by triturating the tincture of the balsam with mucilage of acacia gum, which renders it miscible with water; and in this form they may be usefully combined with ipecacuanha and preparations of opium. *Copaiba*, which is improperly regarded as a balsam, may be exhibited under similar circumstances. It is probable that it acts on the mucous membrane of the bronchial tubes, in nearly the same manner as on that of the urethra in gonorrhœa, by entering the circulation, and exciting a new action on the irritated surface. It is only by admitting that it operates in this manner, that we can account for the benefit which frequently results from its administration in the advanced stages of phthisis.

Among the plants yielding bitter extractive in combination with mucus and fecula, employed as expectorants, we find *marrubium vulgare*, *tussilago farfura*, and *cetraria Islandica*. If the first of these, the horehound, was too much vaunted by the ancients, its expectorant properties have been unaccountably neglected by modern British practitioners. It possesses stimulant powers, alters the state of the bronchial secretion, and seems to impress a new action on the diseased surface; besides promoting expectoration, it diminishes the oppression of the chest, relieves dyspnoea, and improves the digestive function. We have seen much advantage result from its employment in humoral asthma, accompanied with great oppression, and when the sputa was tough, ropy, difficult to be expelled, and causing pain in the expectoration. Many authors, as well as Tralles, have recommended *marrubium* in phthisis. Although we have had no reason to place any reliance on its powers in tubercular consumption, yet we have witnessed much benefit produced by it in that variety of the disease which has been named catarrhal, in which there is much cough, with copious excretion of mucus; a diurnal fever recurring twice a day, nocturnal sweats, and great prostration of strength. In this state the combination of the expectorant and tonic powers found in *marrubium* have proved highly beneficial. The dried plant may be administered in the form of powder, mixed with syrup of white poppies, or in the form of an aqueous or a vinous infusion. The aqueous infusion may be made with $\mathfrak{z}\text{i}$. of the dried plant and a pint of boiling water; the dose is $\mathfrak{f}\mathfrak{z}\text{ii}$. given three or four times a day.

Tussilago farfura, coltsfoot, has been as much neglected as horehound by the moderns, although it held the first rank as a pectoral among the ancients; indeed its name* speaks the estimation in which it was formerly held. Although it has not deserved the praise bestowed upon it by the ancients, yet *tussilago* possesses expectorant properties by no means contemptible. As a gentle tonic expectorant, the writer of this article can bear ample testimony to its influence in the sequel of hooping-cough, when the habit is greatly weakened and the cough continues; and he has seen it equally beneficial in many cases of chronic catarrh. It is best administered in the form of decoction, in making which, care should be taken to strain carefully, as the hairs of the pappus of the flowers sometimes irritate the gullet and excite much uneasiness there. It cannot be prescribed in combination with acetate of lead.

Cetraria Islandica, or lichen *Islandicus*, or Iceland liverwort, or Iceland moss. Notwithstanding the encomiums which have been passed upon it by Scopoli, Hertz, Schneider, Stoll, Wandsorff, Sir Alexander Crichton, and other justly distinguished physicians, it is doubtful whether this plant possesses any ex-

pectorant influence. "In phthisis," says Sir Alexander Crichton, "its good effects consist in improving the matter to be expectorated; in diminishing the frequency of the cough, and rendering it more easy; in calming the irritability of the patient, and in preventing or much moderating hectic fever."* He, however, admits that it did not fulfil his hopes in the cases which he saw treated with it at Vienna; and we have never seen any benefit derived from its use as an article of diet. In preparing it the bitter should not be entirely extracted; as, in that case, it is merely a nutritive substance, well calculated for phthical patients, but possessing no medicinal influence.

Among the inorganic substances of this division of expectorants, *ammonia* and its carbonate are admirably adapted to free the bronchial system from the load of mucus which oppresses it, after attacks of acute pneumonic inflammation in debilitated habits, especially when the expectoration suddenly stops and suffocation is threatened. They operate by the influence which they exert on the nervous system, without augmenting, in an equal ratio, the action of the heart and arteries. The dose of both preparations must be regulated by circumstances: that of the carbonate may be carried to gr. x. or even gr. xv., and repeated every second hour until the effect is produced; after which the dose should be diminished and the intervals extended. Owing to the heat of fauces which it causes in the act of swallowing, it should be involved in some mucilaginous substance, such, for instance, as a combination of the compound powder of tragacanth in almond emulsion.

b. The general expectorants which affect the pulmonary excretories by the nausea which they induce, are few in number. In attempting to explain their mode of operating, we must take into consideration the similarity between the function of the skin and that of the mucous membrane of the bronchial tubes. Both are exhalant organs; and both, in febrile and inflammatory states of the system, are liable to suffer constriction capable of impeding their exhalant function, and giving origin to a train of symptoms depending on a deficiency of the natural lubricating mucous secretion. In this condition of the mucous membrane, antimonials and nauseating remedies relax this constriction, and enable the secretion to proceed; but still it may be demanded—in what manner do such nauseants promote expectoration? It is probable that, during the state of constriction of the bronchial exhalants, any mucus then existing in the air-tubes is of a very acrid character; but as it remains adherent, it excites no effort for its expulsion: when, however, the constriction is relaxed, and it becomes diluted and moveable, it still remains sufficiently acrid to stimulate the glottis and larynx, and thus to call into sympathetic action the whole set of re-

* *Tussilago* is a compound of *tussis* and *ago*.

* London Medical Journal, vol. x. p. 229.

spiratory muscles requisite for the effort of coughing, to expel the now loosened mucus. This explanation is not completely satisfactory: it explains the mode in which the viscid mucus is diluted, but not well that by which it is expelled.

Among the antimonials, the *precipitated sulphuret* was formerly much employed in asthma and chronic catarrh, but the uncertainty of its operation has greatly narrowed the chances of its influence proving beneficial; and as tartar emetic answers every indication, it is now generally preferred. For expectorant purposes, tartar-emetic is given in minute doses; for instance, from one-tenth to one-fourth of a grain, repeated at short intervals. In order to secure its expectorant effect, the surface of the body should be kept moderately warm. It is sometimes combined with squill and other vegetable expectorants; but these combinations improve neither the powers of the tartar-emetic, nor those of the other matters with which it may be combined. Its influence, however, is augmented by the addition of opium, which has been erroneously supposed to diminish the bronchial exhalation; on the contrary, it not only aids other expectorants, but promotes it when given alone: an effect which is to be attributed partly to its increasing the natural secretion of the mucous membrane, partly to its sedative property diminishing the irritability of that membrane.

Before closing this article, it is necessary to offer a few remarks on the circumstances which should regulate us in our selection of expectorants. The first object is to ascertain the nature of the cough, whether it be connected with a state of inflammatory action in the pulmonary organs, or with one of debility; and in that case, whether it be kept up by nervous irritation. In every pulmonary disease attended with cough, there is reason for thinking that the early symptoms are those of inflammation; at that period, therefore, expectorants are of little value, except as auxiliaries in bringing on a crisis; but after the inflammation is partly subdued, then the most salutary effects are obtained from expectoration. In this stage of the disease, the nauseating expectorants are to be preferred; but when the inflammatory action is wholly subdued, those stimulating substances which we have described as calculated to produce the expiratory effort necessary to throw off the load of mucus with which the lungs are oppressed, are then required. It is easy to conceive that thickened or, as they are termed, well concocted sputa, which are generally sufficiently glutinous to adhere together in masses, will be more easily detached and ejected by coughing than a thin mucus, whether accumulated in the tubes, or spread out upon their sides. The necessity, therefore, of ascertaining whether the disease be one of excitement or debility is essential: it is necessary, also, to take into consideration the period of the attack, whether it be the commencement, middle, or termination, when we are called upon to pre-

scribe; for although each of these periods may be benefited by expectoration, yet the substances employed to effect this require to be very different in their characters, according to the period in which they are given. In illustration of this point, we have only to take as an example a case of pneumonia. In the commencement of the attack the bronchial tubes are comparatively dry; but if this state be overcome, either by the use of the lancet, or by a tendency to a spontaneous crisis, the quantity of mucus is then preternaturally increased, and is often tinged with blood. The most favourable symptom in this state is a free expectoration; the most unfavourable, the sudden cessation of it. Our object, therefore, should be to aid this effort of nature, or to produce an artificial state resembling it; not with the view of throwing off morbid matter, but upon principles of a sounder pathology. In the commencement of the attack, if there be any reason for endeavouring to promote expectoration, it must be effected by the gentlest means; such, for instance, as the inhalation of warm aqueous vapour, or by nauseating doses of *ipeacacuanha*, tartar-emetic, and opium. Full vomiting, in this state of the chest, is also, occasionally, highly beneficial; and although, on a *prima-facie* consideration of its mode of action, it may seem at variance with the means just recommended, yet, by favouring a transfer of action, it often induces an increased secretion of mucus from the pulmonary exhalents, productive of the most marked relief. To effect this benefit, however, the vomiting must be full and maintained for a specific time, certainly not less than an hour. If, notwithstanding the employment of these means, the expectoration become too abundant, so as to obstruct the free entrance of the air into the lungs, then the stimulating expectorants are indicated, squill, ammoniacum, the balsams, ammonia, and the topical application of the expectorant gases.

The nauseating expectorants are equally indicated in the commencement of catarrhs, especially in the epidemic variety termed influenza. After bleeding moderately, and the administration of an emetic, the best results have followed the employment of small doses of *ipeacacuanha*, in combination with squills and opium; but when the febrile symptoms have disappeared, and cough attended with a thin frothy excretion only remains, the balsams, gum-resins, and opium, administered in the evening and at bed-time, prove generally highly beneficial. The same precautions are requisite in the administration of expectorants, in the commencement and in the advanced stages of phthisis. In the greatest number of cases of asthma of a recent date, some degree of inflammation is present; but from the progress of the paroxysm, and its termination in expectoration, an erroneous notion was entertained that the solution of the paroxysm must necessarily follow its appearance; and, consequently, squill, ammoniacum, and other sti-

mulant instead of the nauseating expectorants were inconsiderately prescribed, and often produced injurious consequences. In that variety of asthma, however, which appears to depend on a state approaching to that of paralysis of the system of the par vagum, in which the bronchial cells, being deprived of their nervous energy, do not contract sufficiently to aid the expulsion of the air in expiration, and, instead of aiding, prevent the necessary change of the blood in the pulmonary circulation, the nauseating expectorants prove hurtful, by keeping up that state of diminished excitability which is the result of the morbid condition of the bronchial nerves. It is in such cases, and in the low stage of pneumonic inflammation, when the febrile symptoms assume a typhoid character and the lungs are loaded with mucus, that the inhalation of the expectorant gases, the internal administration of the balsams, and more especially of ammonia, prove undoubtedly beneficial.

Under all circumstances there are three general rules to be kept in view in administering expectorants:

1. The surface of the body should be kept moderately warm, and even in a gentle or breathing perspiration.

2. Whatever determines to the kidneys must be avoided.

3. Purging is not only not to be promoted, but to be most carefully guarded against; for as the action of the secreting vessels of the lungs and those of the intestines are opposed to one another, expectoration is checked when purging occurs.

(A. T. Thomson.)

EXPECTORATION.—This word (from *ex* and *pectus*) strictly signifies the *act of discharging* any matter from the chest, but by a figure of speech it is also commonly applied to the *matters discharged* from the lungs and air-tubes.

The act of expectoration is one of the instances of combined movement in the respiratory machine, which, by an admirable and harmonious consent between its numerous muscles, unerringly produces such a variety of actions. The function of respiration is of such vital importance that accumulations or effusions which obstruct it endanger life itself. The structure of the bronchial tree contributes greatly to the easy removal of any superfluous matter in it that might cause such obstruction, for the sum of the area of its branches being considerably greater than that of the trunk, or of the trachea, the air commonly finds easy entrance into the air-cells, and, on its more rapid return in expiration, carries with it the superfluous matter. Thus, ordinary respiration tends to prevent, in spite of gravitation, any accumulation in the air-tubes; but the excretion is more completely effected by coughing, and special efforts of expectoration. These consist of a quick and forcible expiration, preceded by a deep inspiration, and accompanied with a constriction of the larynx and trachea,

the effect of which is to bring any superfluous matter into positions from which the air, forcibly expired, drives it through the glottis. It is worthy of remark that expectoration cannot effectually take place without a previous full inspiration, by which air is carried beyond the accumulating matter; hence, when this is prevented, either by weakness of the respiratory powers, or by the impermeability of the bronchial tubes, the excretion is suppressed. The first of these causes of obstructed expectoration is exemplified in adynamic fevers, which may thus prove fatal: the second occurs in pneumonia in the stage of hepatization, and, if extensive, must lead to a fatal obstruction of the respiratory function. They probably occur together towards the fatal termination of bronchitis, phthisis, and other severe diseases of the lungs.

Expectoration in its other sense, namely, the matter expectorated, is a subject well worthy of a careful study; for its characters often furnish signs of the greatest value in the diagnosis, prognosis, and treatment of diseases of the chest. It can scarcely be said that the examination of the sputa is entirely neglected in this country; but we have had frequent occasion to observe that opinions are very loosely and vaguely formed from it, and of a nature quite inconsistent with the present state of pathological science. Thus the presence of pus in the expectoration is frequently looked upon as a sure proof that the lungs are "diseased;" whilst the far more pathognomonic sputa of peripneumony and the well marked secretion of acute bronchitis are hardly recognized.

The natural secretion of the bronchial mucous membrane is a colourless liquid of somewhat glutinous quality, like a thin solution of gum arabic. It does not greatly differ in chemical composition from the serum of the blood, and it owes its viscosity to an animal substance, which Dr. Pearson,* Dr. Bostock,† and Berzelius‡ concur in considering an imperfectly coagulated albumen. This secretion is the basis of most of the varieties of expectoration; but, unhappily, our knowledge of animal chemistry does not enable us to discover the precise nature of the changes in composition which produce these varieties. All that we learn is that albumen, in different forms and proportions, is present; for, whether the expectoration be mucus, serum, pus, tuberculous matter, or coagulated lymph, the chemist can discover in these but scarcely discernible varieties of this same principle. There seems to be a considerable variation in the proportion of saline matter in different kinds of expectoration; and on this depends a distinction, formerly much insisted on, by means of the salt or sweet taste. This criterion certainly fails in distinguishing pus from mucus; but we think that an excess of saline matter may be taken as a sign of inflammatory action in

* Phil. Trans. 1809.

† Elementary System of Physiology, vol. ii.

‡ Annals of Philosophy, vol. ii. p. 382.

the mucous membrane. It is by its mechanical and visible conditions, however, that expectorated matter is most distinctly characterized; and to examine these fairly, the entire sputa should be collected in one or more convenient vessels of white ware or glass, in which their quantity, colour, and consistence, can be minutely scrutinized.

In acute bronchitis there is at first a diminution of the natural quantity of the bronchial mucus, with a sense of roughness and dryness in the larynx and trachea; but soon a saltish liquid is secreted, which increases as the inflammation reaches its height. It is transparent, almost colourless, and moderately viscid, resembling raw white of egg diluted with water. It generally retains a good many air-bubbles within it, and if expectorated with much coughing, it is usually covered with a froth. When poured from one vessel into another, it falls in a stringy or ropy stream. Andral* considers that its viscosity is in proportion to the intensity of the inflammation; an increased viscosity being always accompanied with an aggravation of the fever, dyspnoea, and other symptoms. When the bronchitis is attended with fever, he remarks that the sputa become more viscid during the febrile exacerbation; insomuch that one inexperienced might be led to suppose that the inflammation had extended to the parenchyma of the lung: after the paroxysm, however, they return to their former state. At the height of the inflammation, and at other times when the cough is violent, they are sometimes streaked with blood: this is produced by the efforts of coughing, and does not tinge the whole mass. These characters are sufficient to distinguish the expectoration of bronchitis in its first stages; and as long as it remains in this state, there is no improvement of the symptoms; but when the sputa become pearly or opake, or of a yellow or greenish-white appearance, we may be pretty confident that the inflammation is on the decline. This opacity is first perceived in the morning expectoration, and in a few points only; and it is uniformly accompanied with an amelioration of the symptoms. The evening exacerbation sometimes brings back the glairy transparency of the secretion; but, unless there be relapse, the opacity returns on the succeeding morning, and gradually extends to all the expectoration, which is then nearly opake, and greenish or yellowish white: the smoke and dust in the respired air sometimes communicate a grey or dirty tinge. This change is often remarkably conspicuous after the successful operation of a sudorific; and, in fact, free perspiration will sometimes partially accomplish it early in the disease. After the expectoration has thus become ripened or concocted, it is coughed up readily, and in loose distinct pellets, which, although glutinous in themselves, do not so readily unite into one mass as before; they gradually diminish in quantity, and in a corresponding degree the cough and other sym-

ptoms cease; a relapse is equally marked by a return of the expectoration to its glairy transparent state. Sometimes a cold is prolonged by a series of relapses; and, notwithstanding the length of its duration, the sputa retaining the same character, the affection preserves its chronic form, and does not terminate until the same change has taken place. These successive transitions, which were noticed by Hippocrates and Aretæus, are highly useful to the practitioner in discovering to him the state of the disease, and, taken with the pulse and physical symptoms, will safely guide him in the employment of his remedies.

The expectoration in chronic bronchitis is of a very diversified character, and is therefore much less certain in its indications. There is generally in it, opake, yellowish, or greenish-white mucus, like that expectorated at the termination of the acute disease; but it is usually more diffuent, and often floats in a pituitous or serous liquid. The same mucus is sometimes voided in a more inspissated form. Andral describes it as resembling false membranes, and moulded into the shape of the bronchial ramifications; and Dr. Cheyne* and Laennec give accounts of a similar expectoration. In the milder cases the mucus thus modified constitutes the whole expectoration; but in a severer form of the disease purulent matter is added, and the appearance, consistence, and odour of the sputa present very great variety.

Many tests have been devised to distinguish pus from mucus; but from what we have before remarked on the close similarity of their chemical composition, it may be judged that they pass by insensible gradations into each other. The utility of minute distinctions of this sort may therefore well be questioned, as they neither enlighten us on the pathology, nor guide us in the practice. Pus is much less viscid than mucus, and not retaining air-bubbles, as mucus does, it commonly sinks in water, whereas mucus generally floats at the surface; and this test gives us as much as is useful in the distinction. When the two are mingled in various proportions, this and all other tests fail in discriminating them. Proceeding from different parts of the bronchial membrane in different degrees of inflammation or morbid affection, some portions of the expectoration are mucous and viscid, whilst others are purulent and diffuent; some greenish-white like pus; others grey, dirty-looking brown, or tinged with blood: generally they are inodorous, but sometimes they exhibit a remarkable fetidity. These characters, however varying, are unquestionably diagnostic signs of chronic inflammation of the bronchial membrane; but their value in the prognosis and in practice is greatly diminished by the circumstance of such chronic inflammation being frequently complicated with other lesions. It almost always, for instance, accompanies the last stage of tubercular dis-

* Pathology of the Membrane of the Larynx and Bronchia. p. 147.

* Clinique Médicale, tom. ii.

ease in the lungs, generally furnishing a great part of the matter expectorated; and its existence is of small importance compared with the phthisical lesion. An inspection of the expectoration alone often fails to distinguish these combined cases from those of simple chronic bronchitis. In general, it may be said that purulent sputa indicate a severe form of disease; but they neither necessarily imply phthisis, nor any other irremediable malady. The chronic bronchitis excited by habitual inhalation of dust or powder, as among needle-pointers, leather-dressers, porcelain-makers, &c. is commonly attended early with purulent and bloody expectoration; but if the cases are treated in time, and the patients are removed from the continued application of the exciting cause, they generally recover. So also, severe cases succeeding to measles and scarlatina sometimes present purulent expectoration, yet they are far from being universally incurable. We repeat, therefore, that puriform matter in the expectoration, as a prognostic sign, only indicates an aggravated form of disease.

The nature of the expectoration gives the distinctive characters to the diseases termed by Laennec dry and pituitous catarrh. The former is a kind of asthma, attended with no other expectoration than scanty pellets of very tough grey mucus, which lodge in the bifurcations of the bronchi, and sometimes cause severe fits of asthma. It is important to recognize the expectoration of this disease, as it is singularly benefited by the alkaline treatment recommended by Laennec. Pituitous catarrh, or humoral asthma, is remarkable for the profuse watery expectoration which accompanies its paroxysms. This discharge contains albumen, coagulable by heat, and seems to differ but little in nature from the serum of the blood. Its quantity is sometimes enormous, amounting to several pounds in weight. These two forms of secretion sometimes occur at the same time in different portions of the bronchial membrane; and the serous discharge, in smaller quantities, is a common accompaniment of chronic bronchitis.

The expectoration of pneumonia is very characteristic. For the first two days there is seldom any expectoration; but, about the third or fourth, a viscid transparent liquid is spit up, uniformly tinged with a rusty or orange hue. At first its viscosity is not so great but that it can be poured from one vessel into another, and it falls in strings or ribands; but in proportion as the inflammation reaches its height, and passes to the stage of hepatization, it becomes so glutinous that the vessel may be inverted, and even shaken without its falling. The red tinge is generally proportionably increased, but this is a less certain test than the viscosity, of the intensity of the inflammation. If the inflammation declines or is mitigated, the sputa become less viscid and rusty, until they present the characters of the expectoration in bronchitis. It is to be regretted that this valuable and truly distinctive sign does not show itself early and constantly in the disease. When it is present, it may confidently be de-

pended on, but its absence by no means improves the existence of pneumonia. In some individuals it never occurs; and in children it is difficult to obtain a sight of the expectoration. It is also important to know that many adults, like children, invariably swallow the expectoration. The physical signs are, therefore, alone to be depended on in the diagnosis of negative cases. As a prognostic guide the sputa are highly instructive. The unfavourable import of a late appearance of the sputa was noticed by Aretæus; but M. Andral first pointed out the proportion which their viscosity bears to the intensity of the inflammation. As long as this goes on increasing, or remains undiminished, we may be sure that the inflammation is predominant; but if the expectoration shews a disposition to return to the colourless and less viscid state of simple bronchitis, the disease may be known to be on the decline. In a few cases the expectoration increases in viscosity up to the hour of death, but more generally it is either suppressed or changed, particularly if the inflammation have proceeded to the stage of suppuration. The suppression of the expectoration was considered by the ancients an unfavourable omen; modern pathology discovers that it is so, either because it proves the inability of the patient to expel it, or because the secretion has ceased, and the inflammation passed to the hepatized and suppurated stages. In the former case suffocation must soon ensue from the accumulation in the bronchi: in the latter the rusty expectoration is often replaced by other kinds. Sometimes it consists of brownish dirty-looking opaque mucus; sometimes whitish specks, as of pus, are seen in it, and, rarely, it is entirely purulent.

M. Andral describes another kind of expectoration which he considers generally to indicate the stage of suppuration. This is a deep reddish-brown and slightly viscid liquid, like the juice of preserved prunes or liquorice water. In six out of nine cases in which this was observed, the lung was found, on dissection, in the state of purulent infiltration; in two it was hepatized; the remaining case was a slight one, and recovered. Laennec does not attach any importance to this kind of expectoration, considering it only as the sign of a cachectic or scorbutic habit. It certainly cannot be considered distinctive, but it may be taken presumptively, and must generally be looked upon as an unfavourable sign. The tinge of the characteristic peripneumonic sputa, which is, in different instances, greenish-yellow, orange, rust-coloured, and bright-red, obviously proceeds from the colouring matter of the blood, intimately mixed with it in various proportions. If the inflammation terminates in resolution, this tinge diminishes and disappears, and the sputa exhibit the characters, and go through the changes of the expectoration in bronchitis.

In pure pleurisy there is either no expectoration, or one simply of a catarrhal nature. The fluid secreted in chronic pleurisy has been sometimes known to make its way into

the bronchi, and to be evacuated by expectoration; but other signs must rather be depended on for discovering the nature of such a case; as a similar expectoration is sometimes derived from a pulmonary abscess, and even from sudden and copious secretion from the bronchial lining only.

The character of the sputa has been more consulted in the diagnosis of consumptive diseases than in any other; but the advances which have of late been made in developing the true nature of tubercular phthisis, have proved that all the distinctions and tests proposed are more or less fallacious. Thus it was long held that the presence of pus in the expectoration was a pathognomonic sign of pulmonary consumption; and all efforts were directed to find out a sure method of detecting it and of distinguishing it from mucus. We have already remarked that purulent expectoration is not an uncommon consequence of simple bronchitis, and this disease presents all the phases formerly ascribed to phthisis. Something of the prognosis may, we believe, be learnt by consulting the expectoration, but its distinctive characters are to be depended on only after repeated examinations, and in combination with other signs, particularly those of auscultation.

In the first stage of phthisis, that of miliary tubercles, there is either no expectoration, and the cough is dry, or it is of a simple bronchitic nature. When the lungs are thickly studded with miliary tubercles, there is not unfrequently an abundant serous secretion like that of pituitous catarrh, which is accompanied with a constant and general mucous rhonchus in the lungs. Whenever these present themselves for any length of time in an individual of tuberculous diathesis, and especially if there be any irregularity of resonance on percussion about the clavicles, we consider the fate of the patient almost certain, and the disease will probably run a very rapid course. Except in this case, and in that of hæmoptysis, which is treated elsewhere, (see PULMONARY APOPLEXY and HÆMOPTYSIS), the expectoration does not assist us in the first stage of phthisis.

The characters of the sputa in the second stage, or during the softening and evacuation of the tubercles, would be much more distinctive were they not almost always mixed up with the mucous and muco-purulent secretion of a chronic bronchitis, which always more or less prevails at this period. Hence the signs, as relating to the tubercular disease, must be considered in a corresponding degree ambiguous. Attentive examination will often discover in the mucus expectorated fine whitish streaks, which consist of the softened tubercle; more rarely there are little yellowish white masses like grains of boiled rice, which are portions of crude tubercle. As the softening proceeds and the cavities are enlarged, the sputa become less frothy, sink in water, and are principally composed of greenish white masses of irregular shape and outline, sometimes tinged in parts of a dirty red or brownish colour,

These flatten at the bottom of the vessel like a piece of money, whence they have sometimes been called *nummulary* sputa. In some rare instances small portions of the pulmonary tissue itself have been detected with the preceding. When the disease is further advanced, the expectoration assumes a brown, dirty green, or grey colour, and the sputa are frequently surrounded with an areola of a bloody tinge. It is exceedingly difficult to say what degree of weight should be attached to these several appearances, even when they are unequivocally seen. It might be supposed that the presence of the whitish streaks or of the little white masses would be conclusive, as being themselves tubercular matter; but appearances of the same kind may present themselves from other sources. The minute bronchial ramifications, in chronic inflammation, sometimes secrete a purulent liquid, which may produce the same streaky appearance; and vermicular concretions and filaments of yellowish white lymph formed in the same way may be mistaken for little fragments of tubercle. The little rice-like bodies, which were considered by Baglivi, and Bayle, and even by Hippocrates, as indications of phthisis, are moreover closely simulated by certain sebaceous concretions formed in the tonsils, and, according to Andral, by similar productions from follicles in other parts of the pulmonary mucous membrane. The white matter from the tonsils may, however, be always distinguished, as Laennec has pointed out, by their fetid odour and by their greasing paper when heated; and without attention to this test, the sign cannot be depended on. The globular yellowish white masses, like irregular balls of flock or wool, which apparently consist of pus held in shape by a little tenacious mucus, have been noticed by several writers as peculiar to phthisis. Dr. Forbes* says that this kind of expectoration has appeared to him to be most common in young subjects of a strongly marked strumous habit, and in whom the disease was hereditary. A precisely similar appearance is, however, sometimes presented by the sputa in chronic bronchitis. The dirty brown or green matter, flattening and becoming nummular when separate, and when together forming a smooth sluggish *purilage*, which appears later in the disease, and takes its origin from the tubercular excavations, is much more certainly characteristic of phthisis. To sum up, we may say that an *occasional* examination of the sputa, by far the greatest part of which, as Laennec has remarked, proceeds from an accompanying bronchitis rather than from the tubercular disease itself, can only enable us to distinguish phthisis in the very rare case of tubercular matter, or portions of the tissue of the lung being present: but, with Dr. Forbes and M. Andral, we think that by a daily careful inspection of the expectoration, we shall not fail to find in the successive and progressive changes which it presents, the means of forming a pretty

* Transl. of Laennec, 3d edit.

accurate diagnosis, which, if confirmed by the general and physical signs, will leave no shadow of doubt.

As our design in this article has been rather to direct the attention of the practitioner to the importance of expectoration as an aid in diagnosis and prognosis than to give a complete account of the subject, we refer for further descriptions to the articles in which the diseases of the chest are particularly treated of.

In conclusion, we would strongly recommend our readers to consult the second and third volumes of Andral's *Clinique Médicale*, and Dr. Forbes's translation of Laennec's *Auscultation Médiate*, where they will find instructive and convincing proof of the assistance which the expectoration gives, especially if taken in conjunction with the physical signs, in the distinction and treatment of diseases of the chest. (C. J. B. Williams.)

FAVUS. The pustules termed *favi* are so named from the character of the crusts by which they are succeeded; these being cellular, and fancifully compared to an irregular *honeycomb*. The term *favus*, however, was differently employed by the ancients: Galen applied it to ulcers which exude, through small orifices, a matter resembling honey in consistence; Celsus regarded it as synonymous with *miliary*. *Favi*, in the modern acceptance of the word, are small, yellow, irregularly circular pustules, nearly flat, at least not acuminated; and, according to Biett, always depressed in the centre. Their base is slightly inflamed; they generally appear in circular patches or clusters; are attended with itching, and frequently with glandular swellings from absorption of the matter. These pustules are succeeded, after some days, by a thick yellow, nearly semi-pellucid, somewhat cellular, augmenting crust or scab; at which time they frequently exhale a very offensive, nauseating odour, not unlike that of the urine of a cat. As the crusts dry, they become white, and easily detached.

The seat of *favi* is most commonly the scalp, in the epidermal layer which covers the papillæ of the true skin. As they most commonly occur on parts covered with hairs, Dr. Duncan advanced an opinion that the disease is in the bulb of the hairs, which are indeed easily detached, and display a swelling at the base. Biett accords with this opinion; but Rayer dissents from it, and supports the view which we have adopted.

Favi generally occur during childhood; they seldom affect the general health, although, when they appear during the period of dentition, they seem to be in a great degree connected with the disordered state of the digestive organs which more or less attends that period, and the increased irritability of the habit. They occasionally, however, appear in adults, on the neck, ears, and occiput: in these cases they are always preceded by some degree of constitutional derangement; headache, an uneasy state of stomach, loss of appe-

tite, irregular bowels, and fever: the inflammation surrounding the pustules is more extensive, and the crusts are thicker and harder than in childhood. Alibert affirms that cooks are very liable to eruptions of *favi*. They are chiefly known as the distinctive feature of one species of porrigo,—*P. favosa*; under the head of which we shall have again to direct the attention of our readers to their characters. Biett* supposes that the minute pustules of porrigo *scutulata*, which appear in circular patches, are *favi*, differing only in their arrangement and some little variation in the state of the crusts; but as far as we are enabled to form an opinion by the appearances which they present, when viewed with a powerful magnifier, the opinion of Bateman,† who regards them as *achores*, is correct. Rayer‡ considers both the pustules and crusts intrinsically different from those of porrigo *favosa*.

As we shall have again to detail the treatment of *favi* under the article porrigo *favosa*, we have only to mention, at this time, that it consists in correcting the irritable state of the stomach, and in not permitting crude undigested matters to remain in the alimentary canal. This is best effected by moderate doses of hydrargyrum cum creta, combined with antimonials, administered at bed-time; and alkaline salts, particularly subcarbonate of soda, in combination with calumba, or cascarrilla, or cinchona bark in powder, given twice or three times a day. It was the opinion of Ætius and other old writers, that danger attended the repulsion of *favi*: modern practitioners, regardless of this, employ a variety of external applications; but these are general mild stimulants, intended rather to restore the healthy action of the skin, after the crusts have been removed by poultices, than to repel. They consist of ointments composed with the oxides of zinc, acetate of lead, and tar with sulphur; and the ointment of nitrated mercury largely diluted with simple cerate. When there is much itching or pain, the writer of this article has seen great benefit derived from the following lotion, applied in a tepid state, in the form of a poultice.

R. Liquoris plumbi subacetatis, *f* 3i f3.

Acidi hydrocyanici, *f* 3ii.

Aquæ distillatæ, *f* 3vi. M. Fiat lotio.

Cleanliness, exercise in the open air, and the stimulus of soap and hot water, are great aids to every method of treatment. Much depends on diet, which should be apportioned both in quantity and quality to the powers of the stomach and the general strength of the patient. If the patient is weak, which is generally the case, the food should be nutritive, but not stimulant: we have found nothing answer better than milk, with a moderate allowance of plainly cooked mutton or poultry

* Abrégé pratique des Maladies de la Peau, par MM. Cazemene et Schedel, p. 231.

† Synopsis, edit. 7th, p. 138.

‡ Traité théorique et pratique des Maladies de la Peau, par P. Rayer, vol. i. p. 520.

once a day. Wines and all kinds of fermented liquor are injurious.

Favi appearing under the form of porrigi favosa are contagious; and it is probable that they are equally so when they suddenly appear as symptomatic of derangements of the stomach and chylopoietic viscera; but we have seen no positive demonstration of their contagious nature under these circumstances.

(A. T. Thomson.)

FEIGNED DISEASES. It is our intention to notice under this head all that class of alleged corporeal disabilities which are either pretended or intentionally induced. In strictness of classification, cases of this kind should be arranged in four groups:—

1. Feigned diseases, strictly so called, or those which are altogether fictitious.

2. Exaggerated diseases, or those which, existing in some degree or form, are pretended by the patient to exist in a greater degree or different form.

3. Factitious diseases, or those which are wholly produced by the patient, or with his concurrence.

4. Aggravated diseases, or those which, originating in the first instance without the patient's concurrence, are intentionally increased by artificial means.

It is not, however, our intention to adopt this classification in the present article. We shall arrange all the diseases under one head, and in alphabetical order; this method being more simple, more in accordance with the general plan of this work, and affording greater facilities for practical reference. We may also here observe, that, for reasons of convenience, we shall apply the term *feigned* to all the varieties of these disabilities.

The following are the classes of persons by whom diseases are chiefly feigned, and the causes of their being so:—

1. Men apprehensive of being levied, or actually levied, or forced into the military or naval services: conscripts; men liable to serve in or to be drafted for the militia; impressed seamen. The cause of diseases being feigned by such persons is the hope of being deemed unfit for the duties of the public service, and thus to escape it altogether.

2. Soldiers, and seamen in the navy. The causes which induce these persons to feign disease are chiefly the following:

a. To obtain their discharge from the service, with or without a pension.

b. To avoid the performance of the duties imposed on them; to escape some particular service that is disagreeable to them, or to obtain some other that is agreeable; to obtain a removal from one climate or station to another; to obtain the ease and comfort of an hospital, &c.

c. To avoid an apprehended or adjudged punishment.

Soldiers and sailors feigning disease are commonly designated as *malingers* or *skulkers*. The latter term is exclusively used in the navy.

3. Slaves. These unhappy persons feign

diseases from many of the motives which influence the soldier and sailor, whose services are compulsory; only they do not seek for a permanent discharge from their labours, which they know to be impossible, except indeed by death. Their chief objects are to obtain relief from labour, and to enjoy the comparative comforts of the hospital.

4. Persons who have subjected themselves to the control of the laws, and are either undergoing punishment or in apprehension of it; persons about to undergo a trial for some alleged offence, or about to be punished for the same; prisoners for debt, or other offences, civil or criminal. The motives of such persons for feigning diseases are sufficiently obvious, viz. to evade or escape punishment or restraint.

5. Persons in civil life who have received slight injuries, and who greatly exaggerate their degree or consequences. This is generally done with the view of extorting a disproportionate compensation from the party injuring.

6. Persons in the lower ranks of life desirous of exciting the attention and compassion, and consequently the bounty of the public, or a maintenance in idleness. This class comprehends the professed mendicant, whether vagrant or stationary, whether gipsy or gentleman-beggar; and also persons in the lower ranks among the poor, who occasionally in this manner practise on their richer neighbours. Under this class, also, come persons in the lower ranks of life who wish to obtain relief from benefit societies, or from the parochial funds, or to gain admittance into or to remain in workhouses, hospitals, &c.

7. Persons not at all in poverty nor living in a constrained position, who assume the semblance of disease from some inexplicable causes. These are chiefly females; but the class is on the whole very small.

We might add to these, other classes from various conditions of life, from the boy "creeping like snail unwillingly to school," up to kings, warriors, statesmen, and various others in high stations, whom history records as having assumed sickness to gain particular objects;*

* Many great names, illustrative of the statement in the text, might be mentioned. The plan adopted by Ulysses to avoid leaving his young bride for the war of Troy, is familiar to the classical reader. The particular manner in which this royal malingerer chose to exhibit his alleged infirmity, and the mode of its detection, are pleasing illustrations of the rude simplicity of early times. The king goes as usual to his agricultural labours, but not as usual like a sober ploughman; he yokes together in the same plough a horse and an ox, and sows his field with salt in place of corn. With the view of putting to the test his alleged disease, Palamedes places Telemachus in the furrow before the father, who betrays his sanity by carefully avoiding the infant. The history of the feigned insanity or idiocy of the elder Brutus is equally well known; as is that of Amnon the son of David, who "made himself sick" for a more guilty purpose. Charles, Duke of Bourbon, constable of France, wishing to desert to the emperor, "feigned sickness in order to have a pretence for staying behind." (Hume.) In like manner,

———"Hotspur's father, old Northumberland, Lay crafty-sick,"

but the above, we believe, contain nearly all the cases that are likely to come under the notice of the medical practitioner.

Some diseases or disabilities are much more easily feigned than others, and the imposture is more difficult to detect. In those diseases of which the symptoms are naturally obscure, or variable and uncertain, much care should be taken not to come to a wrong conclusion. Every medical practitioner knows that there are some diseases which are not indicated by a change of the pulse, an alteration of the natural colour or temperature of the body, or by any evident derangement of its functions. There are also other diseases the symptoms of which are capable of being imitated by the effects produced by certain drugs, or by the use of certain external applications, &c. An intimate knowledge of the anatomy, physiology, and pathology of the human body, and of the effects of the articles of the *Materia Medica*, is therefore essential to enable the medical practitioner to obviate false conclusions and detect imposture in such cases.

When a medical practitioner is called upon to examine, for the purpose of legal investigation, or to treat a doubtful case of disease, he should endeavour to obtain all the information he can respecting the person's moral and physical habits, his probable motives, &c. &c.; and he should also consider whether the alleged causes of the disease are founded in fact, or are probable. Another important point is, to endeavour to ascertain whether the pathognomonic symptoms of the alleged disease are present. "It is obvious," says Dr. Cheyne, "that the more we know of disease by reading and observation, the more patience and temper we possess, the more successful shall we be in the detection of imposture. I am convinced that simulated disease will soonest be discovered by those who conduct the inquiry in the most scientific manner, carefully applying the case in doubt to the description of the disease in standard works of pathology."*

It is difficult for the simulator of a disease to give a consistent account of the origin and progress of his alleged infirmity. By a little management on the part of a medical practitioner, an impostor will almost always be led to enumerate incompatible symptoms, or greatly to exaggerate unimportant lesions. He is constantly prone to overact his part. He is too anxious to impress upon the medical at-

to avoid the battle of Shrewsbury. Essex, the favourite of Elizabeth, is said to have feigned a violent disease to move her compassion; and Raleigh pretended "madness, sickness, and a variety of diseases to protract his examination and procure his escape." (Hume's James I.) Pope Julius III. feigned sickness to avoid the holding a consistory; "and that he might give the deceit the greater colour of probability, he not only confined himself to his apartment, but changed his usual diet and manner of life." By persisting in this plan, however, he contracted a real disease, of which he died in a few days. (Robertson's Charles V.)—It would be easy to add greatly to the above list from the stores of tradition and authentic history, ancient and modern.

* Letter to Dr. Renny, on Feigned Diseases; Dublin Hospital Reports, vol. iv.

tendant the reality and the severity of his sufferings. Remarks are thrown in purposely to obviate objections, and to reconcile the mind to what may seem extraordinary in the narrative; all of which are very unlike the bold simplicity of truth.

With the view of inducing a detected or even suspected impostor to acknowledge his deceit, severe measures, such as the infliction of pain, &c. remedial agents, and even formal corporal punishment, have been occasionally adopted. This practice, however, if it were justifiable, will be frequently found to fail even in the army or navy, where patients are under the control of strict discipline. But it ought to be a general rule that means should never be adopted in the treatment of a doubtful case which we should regret having employed if the alleged disease were to prove genuine. Soldiers and sailors commonly return to their duty when they are deprived of all hope of succeeding in a scheme of imposture; and finesse will often succeed in detecting imposture where harsh measures would completely fail. Dr. Davies, surgeon to the East India Company's depot at Chatham, had a soldier under his care with an alleged affection of the back, which, the man asserted, rendered him unable to move or be moved from his bed. His alleged disability had existed for about a month without any indication that he intended to return to his duty. For the convenience of being watched, &c. he had been accommodated in a ward by himself. Dr. Davies, who considered him to be an impostor, saw no prospect of his *giving in*; but he eventually put in practice a measure which led to detection. He went to the window of the ward in the dusk of the evening, and after gently tapping upon the glass, he in a low voice called the man by his name. He was at the window in an instant, and Dr. Davies had the pleasure of congratulating him on the recovery of the power of locomotion. The man forthwith went to his duty.

Sometimes impostures are discovered entirely by accident, even when they are not at all suspected to exist. The following is a curious instance of this kind. A seaman on board H. M. ship *Otter* feigned a chronic decline so effectually that he not only deceived his surgeon but the physician of the Naval Hospital to which he was sent; and he was about to be discharged from the service, when the true nature of his case was elucidated in an unexpected manner. The mail from the seaport where the man was in hospital was robbed, and the letters were broken open with the view of searching for money. The robbers were however taken, and the letters recovered. Among the opened letters was one from the man in the hospital to his wife, wherein he informed her that his scheme had succeeded, that he was going to be invalided on a certain day, and desiring her to make good cheer against his arrival. This letter was forwarded to Capt. W., and in consequence of its contents, the man, although seemingly in almost a dying state, was returned to his ship. The

letter being read to him, and his hopes thus destroyed, he at once returned to his duty.

It is frequently useful to depart from the usual mode of examining doubtful cases; pre-concerted plans being thereby disconcerted, and an impostor puzzled. One of the writers of this article was requested to look at an old soldier who had been long in a civil hospital on account of an alleged contraction of the left knee, the real existence of disease being doubtful. The examiner went to the left side of the bed upon which the man was lying, and after looking at the contracted knee he desired the man to lie upon his face, by which change the right extremity assumed the place of the left in the bed. The examiner's hand was then placed upon the *right* knee, which became gradually flexed, while the contraction of the left knee disappeared. This man's attention was so completely engaged with the right knee when it was under examination, that he forgot that it was his left knee which he had alleged to be contracted.

It might be an amusing subject of inquiry how particular diseases come to be assumed in preference to others. Our limits will not permit us to enter upon this investigation. A principal, if not the chief cause, is the relative facility with which diseases may be feigned or formed; some, as we have already observed, being much more easily assumed than others. Imitation of the real diseases which the impostors are in the habit of seeing is also at once a frequent source of their knowledge, and the exciting cause of their putting it to account. We have thus known soldiers and sailors carefully study and mimic numerous ailments of their comrades. We remember the case of a soldier who imitated admirably and successfully the gait of a patient with hip-disease, which he had studied from the life in a boy who actually laboured under that affection.

We know not that any excuse is necessary for the extent of the consideration which we purpose to give to the subject of the present article. Certainly none will be expected by those of our readers who either now practice, or formerly have practised, in the medical departments of the army or navy, who are fully aware of its great importance. If there be any practitioner in civil life who entertains doubts on this point, the facts detailed in the present article will, we think, be found more than sufficient to remove them. And although it is especially in the practice of the medical officers in the public service that cases of feigned diseases occur, yet their occurrence in private practice, particularly among the patients of our hospitals and dispensaries, is by no means extremely rare; and many of them are of such a kind as to expose the knowledge or ignorance of the physician or surgeon more positively and more conspicuously than any other cases. Many of them, also, become the subjects of legal investigation, and require medical testimony to be given in courts of law.

In the army and navy it is the duty of the

medical officers to protect the public service from impositions of this kind; and it is well known to those officers who served during the late prolonged wars, how seriously the service both of the army and navy suffered from such impostures being oftentimes successful. On the decision of the medical practitioner as to the true character of doubtful cases, very frequently depends the acquittal or punishment of the alleged invalid; and every one must feel the responsibility of such a position. It is well known to those who have had opportunities of judging, that men in the army and navy, more particularly the latter, have been often treated and punished as impostors, who were really labouring under disease; and also that real impostors have often received the immunities and privileges that ought to belong only to the diseased. The scene in *Roderick Random*, of the captain and doctor curtailing the long sick-list, is probably only a slight exaggeration of what Smollett may himself have witnessed in the olden time of the navy; and although no such scene could be exhibited now-a-days, it must be allowed that nothing but that firmness of purpose which can alone be founded on the knowledge of disease, will always enable the medical officers in that department of the public service to protect the rights of humanity and the dignity of the profession of medicine.

1. *Abdominal tumour.*—(Ascites, tympanites, physconia).—Various affections of the abdomen characterised by external swelling are often both feigned and formed by persons desirous of obtaining certain objects under the cloak of disease. We have seen dropsy simulated for some time successfully, merely by the individual pushing the abdomen forward while in the erect position, and elevating the spine when lying on the back; probably, at the same time, keeping up the distension by means of very short expirations. A complete exploration of the uncovered abdomen will always detect imposition of this kind. It has been proposed in such cases to observe the patient when asleep; but such simulators are sometimes prepared for this test, and wrap themselves up so completely in the bed-clothes that the end cannot be obtained without awakening them.

A more effectual mode of deceiving is, to distend the abdomen by the introduction of foreign substances. Instances are said to have occurred among the French conscripts where water was actually injected into the cavity of the peritoneum, and a true factitious ascites thereby produced. Foderé mentions the case of a woman who produced a simulated ascites by inflating the cellular substance of the abdominal parietes with air, through a small and scarcely perceptible puncture in the groin.* Manual examination or palpation would immediately detect this kind of deception. Tympanitic distension of the abdomen by artificial means has been more extensively and

* Médecine Légale, tom. ii, p. 485.

more successfully practised. MM. Percy and Laurent mention the case of a young soldier who had the power of distending his abdomen enormously by swallowing air. Presenting himself in this state, with clothes made for the occasion, he had no difficulty in obtaining his discharge. He got rid of his tympany at will, "par le moyen d'eructations bruyantes et non interrompues, par haut et par bas."* The following extract from Dr. Cheyne's excellent paper on feigned diseases, in the fourth volume of the Dublin Hospital Reports, will shew the extent to which this mode of deception is sometimes carried. "In the year 1811, from thirty to forty men of the 84th regiment were admitted into the King's Infirmary, labouring, as stated on the admission-ticket, under dropsy and intermittent fever. The abdomen was greatly distended and felt tympanitic; the tongue, with few exceptions, was clean; pulse regular; urine natural, and bowels in general costive. The men complained of pain in the right side, and many of them of pain over the whole abdomen, with excessive thirst, drinking more than a gallon of water daily. The disease was at first considered a consequence of the Walcheren fever; but, from the numbers increasing, and all with the same symptoms, Dr. Harvey was led to conclude that the complaint was feigned. Under that impression he prescribed a solution of Glauber salts in weak tobacco-water, which he called the *infusum benedictum*; a cupful of this detestable compound was given in the morning, and repeated every fourth hour till it operated, and with perfect success; all who were in the hospital recovered speedily, and the disease, which was becoming epidemical, soon disappeared; however, sixteen had succeeded in obtaining their discharge before this method of treatment was discovered." It was reported that the men produced this artificial tympany by swallowing large quantities of chalk and vinegar. Is this probable?

Simulated dropsy, or other abdominal tumour, is a common deception of mendicants, and is by them usually accomplished by the aid of cushions fitted to the belly. A remarkable case of this kind is related, in the *Act. Nat. Cur.*, of a woman who practised this imposition for forty years, and made a comfortable livelihood by it. No tumour was found on examining the body after death, but a pad found in her wardrobe, weighing nineteen pounds, and fitted to the shape of the abdomen, explained the case. A man not long since obtained his living in Edinburgh by the same means; on being detected he enlisted as a soldier.

Abstinence, partial or total.—Abstinence for a great length of time is sometimes feigned in order to excite public curiosity, and, consequently, commiseration and charity. Abstinence beyond a moderate period is contrary to the usual course of nature, and therefore strong suspicion may always be entertained when extraordinary fasting is alleged. The most noted

imposture of this kind in recent times is that of Ann Moore, the fasting woman of Tutbury. According to her own account she fasted from March, 1807, for a period of six years. She certainly fasted for nine days and nights.* For numerous references to similar cases the reader is referred to the *Litteratura Medica* of Ploucquet, art. *Inedia*.

3. *Animals in the stomach.*—Mendicants occasionally allege that they have an animal in their stomach. There was a man not long since in Edinburgh who was remarkably successful in deceiving the public by pretending that he had such an inmate, which he said occasionally came to his throat, a statement he attempted to corroborate by making the most frightful grimaces. It may be mentioned, as in some degree illustrative of the means of deception in such cases, that one of the writers of this article has now under his care a patient affected with partial obstruction of the pylorus, who has the power of producing the most extraordinary noises in his stomach by throwing the abdominal muscles into strong action. The stomach is no doubt enlarged, and as it generally contains an immense quantity of liquid and also much air, the sounds are occasioned by the rapid commixture of these fluids of unequal density. There is a case recorded in the 9th volume of the Edinburgh Medical Journal, which is remarkable inasmuch as Dr. Spence, the reporter, details the circumstances as gravely as if he had no doubt of the fact. A woman, twenty-one years of age, having been indisposed for a few days, took some cathartic medicine, and passed by stool "a reptile of the *lacerta* species." The animal, of which a particular description is given, on the sole authority of the patient, is stated to have been between four and five inches long, and considerably thicker than a finger.

4. *Blindness, total or partial.*—This disease is frequently feigned by wandering beggars, and also by men in the military and naval service. The most common form of assumed blindness is amaurosis; but at other times paralysis of the eye-lids, producing blindness by preventing the access of light, is the alleged disability, and in this case an artificial ophthalmia is often induced at the same time. In feigned amaurosis, if the simulator is skilful and courageous, the deceit is with the more difficulty detected, because in true amaurosis there is sometimes a certain degree of motion in the iris. A remarkable case of pretended blindness is related by Mahon, in which the patient was placed on the steep bank of a river and desired to walk forward. He unhesitatingly did so, and fell into the stream. This test was considered as a proof of the reality of the disease; but he was afterwards induced, on a promise of being discharged the service, to confess that the disease was feigned.† In this case the pupil contracted perfectly; and although this may be no certain proof of soundness of the organ, it is

* Dict. des Sc. Méd. t. xli. p. 328.

* Edin. Med. Journ. vol. v.

† Méd. Légale, tom. i. p. 366.

perhaps fair to admit immobility of the iris on exposure to light as a sign of disease. In the following case the deception was equally complete, but the detection came from a different quarter. A seaman on board the *Utile* frigate, pretending to be totally blind, and believed to be so, was on one occasion permitted to go on shore, and was attended by a man to lead him about the streets. These two happened to quarrel, and even came to blows, when the blind man finding, as might be expected, that he was likely to have the worst of the fray, suddenly regained the use of his sight, and soon got the upper hand of his astonished guide. The latter being worsted, took to flight, was pursued through a great part of the town by his former protégé, and, finally, received a severe beating from him. Next day the impostor was severely flogged, and never afterwards exhibited any deficiency of vision.

Blindness under the form of amaurosis used to be simulated to a great extent by the conscripts for the French army, and for some time with the desired effect. A dilated pupil and an inactive iris, the leading symptoms of this disease, may be induced by the extract of belladonna, the substance supposed to have been employed. When a sufficient length of time is permitted, the means of detecting this fictitious amaurosis are obvious. It has been stated by good authority that two hundred conscripts were exempted from serving in the army by using belladonna.

Intermittent blindness (nyctalopia, hemeralopia) is much more frequently and successfully feigned by soldiers and sailors, more especially in warm climates, where the real disease is of very frequent occurrence. In tropical countries night-blindness occasionally prevails among Europeans epidemically, and hence arise at once the source of the imposture and the difficulty of detecting it. Night-blindness is a common disease in Egypt, and was frequently feigned by our soldiers in the expedition under Abercrombie. "Of some corps," says Dr. Cheyne, "nearly one-half of the men were affected with this complaint, or pretended to be so, for which, however, a remedy was soon found. In the parties engaged in the works, a blind man was joined to and followed one who could see, in carrying the baskets filled with earth; and when the sentries were doubled, a blind and a seeing man were put together, and not without advantage, as during the night hearing upon an outpost is often of more importance than sight."^{*} In tropical climates sailors frequently feign this disease with the view of escaping night-duty. It is hardly possible to detect the imposition by mere symptoms, as in the real disease the aspect and functions of the eye are perfectly natural in full light.

5. *Cachexia, malacia, or pica Africanorum.* (Mal d'estomac, dirt-eating.)—This is a disease which often produces the most extensive ravages among the slaves in the West-Indies, carrying them off slowly, but with the certainty of a pestilence. It is not nearly so common

now as formerly, negroes being much more valuable to their masters, and better treated. It is often a real disease, but it is often, also, a practice voluntarily adopted by the unhappy beings who are the subjects of it, with the object and with the effect of producing death. Still more frequently, perhaps, it is a mixture of real and factitious disease, the primary disorder of the stomach prompting to the ingestion of crude substances, and thus giving the particular direction to the suicidal propensity. Whether it exists as an irresistible propensity, or is adopted as a means of producing disease, the practice of dirt-eating is always done in secret, and is invariably denied. All kinds of earth are eaten indiscriminately, such as the common soil or mould, and the plaster of houses, &c. The disease produced is truly a cachexia, marked by disorders of various functions, diminution of the colouring matter of the blood, &c. and terminating in general dropsy. The patients first complain of pain of stomach (hence its French name), then breathlessness, and inordinate pulsation in the heart and large arteries, particularly of the carotids and aorta, on motion. They become bloated, their nails and the palms of their hands becoming white, and their lips, gums, tongue, &c. quite pallid. These symptoms continuing, anasarca follows, and death, in the great majority of cases, closes the scene. When the practice is carried to a great extent, it may be discovered by examining the stools, which will be found to consist in a great measure of the earth swallowed. Emetics are also administered for the same purpose, and the ejected matters being washed, the earth will be found to subside.*

Various means have been adopted to prevent this practice, and, among others, the affixing to the face an apparatus to prevent eating altogether except in the presence of the overseers; but all are found of no avail while the insignia of slavery are on their bodies, and the hope of freedom in another life is in their hearts. "Negroes," says Dr. Williamson, "anticipate that they will, upon death removing them from that country, be restored to their native land, and enjoy their friends' society in a future state." And upon this, the last consolation of those wretched beings, one of the means of checking the suicidal epidemic is founded. The negroes imagine that if decapitation is performed after death, the transition to their native country is prevented, and hence has been exhibited the horrid spectacle of the heads of the dead negroes placed in some conspicuous situation before their fellows.†

6. *Catalepsy.*—This disease has often been feigned, sometimes in its characteristic form, but more commonly in some of its imperfect varieties. We have nothing to add to the notice of this simulated affection in the article CATALEPSY in this work.

7. *Circulation, disorders of the.*—*Disease of the heart.*—In the French army, during

* Dancer's Jamaica Practice of Physic.

† Williamson's Med. and Miscell. Obs. on the West Indies, vol. i. p. 93.

* Loc. cit. p. 146.

the rigid operation of the conscription, almost every severe disease was simulated with the view of obtaining exemption from service, and many were adopted by the conscripts, the simulation of which must have been suggested by persons well acquainted with disease. The authors of the article on simulated diseases in the *Dictionnaire des Sciences Médicales* mention two cases which were intended to pass, and very nearly did pass, for aneurism of the heart or great vessels. In one of these a ligature was found tightly bound round the neck, and another round the top of each arm. On removing the ligatures, the purple and swollen state of the countenance disappeared, so that the man did not look like the same person, and the disordered action of the heart ceased. In the other case, a very fine ligature was so tightly bound round the neck as to be almost hid by the folds of the skin. This young man announced himself as affected with organic disease of the heart, and his terribly swollen and livid face certainly gave credibility to his statement.

It would appear from the testimony of several writers on the complaints of soldiers and sailors, that these persons are in possession of means of great power to derange the functions of the heart, and thereby to simulate and even to produce disease of that organ. Dr. Cheyne is convinced that many soldiers have the power of quickening their pulses and giving violence to the heart's action, and states that he has frequently found a soldier's pulse at the time of an expected visit, one hundred and twenty or one hundred and thirty, and the same reduced thirty or forty beats within a quarter of an hour upon his repeating his visit unexpectedly.* Seamen are said to produce such a temporary quickness of pulse by striking the elbow forcibly against a beam of wood, and this state they quaintly term *the elbow-fever*. More or less permanent derangement of the circulation is produced by the internal use of tobacco, digitalis, tartar emetic, &c.; and it is well known to all old medical officers in the army and navy that these means are familiar to the skulkers and malingerers of the two services. A much more effective means of deranging the circulation, and, indeed, many other functions, is afforded by white hellebore taken internally; and it appears from a paper of Dr. Quarrier, published by Mr. Hutchinson, that it has been extensively used in the army for this purpose. The practice was introduced into the regiment of marine artillery by a man who had formerly lived with a veterinary surgeon. This man not only produced the disorder in himself, but sold his secret and his drugs to many others. When a sudden and decisive result was sought for, as much as a drachm of the hellebore was administered; but for the more slow and progressive mode of deception, a small dose, such as from four to ten grains daily, was prescribed. The larger dose usually occasioned vomiting, purging, syncope, tremors, and great nervous

irritability, which were followed by great and inordinate action of the heart and arteries, and this was in its turn succeeded by great debility, and sometimes by a disposition to paralysis. By the smaller dose, the stomach, after a short time, became completely disordered, and much nervous irritability and consequent derangement of the circulation ensued. Various other symptoms were observed in consequence of this poison, and in some cases a fatal result was very nearly induced, and would have been so in many cases, Dr. Quarrier thinks, had not the medicine fortunately been adulterated. Many men succeeded by these means in obtaining their discharge from the service.*

8. *Contraction of the limbs producing lameness.*—This disability is often feigned by soldiers, and sailors, and very frequently by mendicants and persons who wish to escape the punishment of "hard labour." A convict who was confined on board the Retribution hulk at Woolwich, during the period of his sentence, which was seven years, kept his right knee bent so as not to touch the ground with his foot all that time; and he was on that account not sent to hard labour with the other convicts. He was commonly employed in executing light jobs, which he could do in a sitting posture. When he moved from place to place, he used to hop upon the left foot with the assistance of a stick. At the end of the seven years he was discharged, and upon going away he very coolly observed, "I will try to put down my leg, it may be of use to me now." He did so, and walked off with a firm step without his stick, which he had previously thrown away.

Mr. Hutchinson considers this imposture as that which is most common in the navy next to ulcer, and relates some curious cases. A young seaman fell from the yard-arm into the sea, and pretending, when taken up, that he had struck his loins on the ship's anchor during his fall, and had thereby broken his back, he was sent to Deal Hospital. No external evidence of injury could be discovered, but he obstinately persisted in his story, and in proof of the alleged fact he constantly kept his trunk bent at nearly right angles with the lower extremities. When a rug was placed on the floor, and he was laid on his back upon it, his legs and thighs were kept erect in the air; and when these were pressed down forcibly, he rose suddenly to a sitting posture, as if his hip-joints were ankylosed. He persevered in his deception for some time, but was soon after detected in the act of deserting from the hospital, running lustily for his liberty. A sailor on board the Druid pretended that his arm was contracted, and so immoveable was the elbow-joint that the ulna and humerus had the appearance of being ankylosed. From long want of use the muscles were wasted. The man had been for a long time excused from duty for the supposed disease. Mr. Hutchinson detected the imposture by a stratagem. Being brought up to be punished, and while

* Loc. cit. p. 165.

* Hutchinson's Pract. Observations in Surgery. Second Edition, p. 149.

eagerly engaged in conversation with the captain, his attention was withdrawn from the limb, and Mr. Hutchinson, who had hold of it, suddenly straightened it without the least effort, in the presence of the whole crew. The man was punished, and immediately returned to his duty with the perfect use of his limb.*

The following cases have come to our own knowledge. In a line of battle-ship, an excellent seaman, and a favourite with his officers, suddenly withdrew from his duty, alleging that he had been seized with a violent pain in his loins which prevented him from assuming any other than a bent position. He was long treated as a real sufferer, and every kind of application (many very severe) was used for his recovery, but in vain. After a period of many months, the surgeon was superseded by another, who soon began to entertain suspicions of the reality of the disease, and made every effort, both by severe treatment and watching, to detect him. But, by day and night, asleep or awake, the patient still retained the same position. At length, however, this accomplished dissembler, like the pretended blind-man formerly mentioned, was betrayed by the violence of his own passions. One day, being accused by a messmate of skulking, he was so incensed that he started up erect, and with all his power inflicted a severe chastisement on his accuser. He now confessed his deceit, and alleged as the cause of it the unjust and injurious conduct of one of his officers.

A seaman on board the Heron sloop pretended that he had lost, in a great measure, the use of his lower extremities, which were contracted; and he was for a long time carried by his messmates from one part of the ship to another. He was at length sent to the hospital at Barbadoes to be surveyed, and being declared an impostor, was ordered to be taken on board his own ship to be punished. On his way from the hospital, however, being made aware of what was waiting him on board, he suddenly started up in the cart, and leaped into a field of sugar-cane, and, although pursued by his attendants, succeeded in making his escape.

During the late war, a seaman was received into Gibraltar Hospital on account of a fractured leg. When this was nearly cured, he began to pretend that the ankle-joint was contracted and the foot turned inwards. This position he obstinately maintained for twelve months, in spite of every effort to restore the limb to its proper position, and in defiance of the harshest treatment. One night, however, he contrived to get intoxicated, and the surgeon having occasion to visit his ward during the night, found him lying perfectly naked on his bed, and his ankle quite straight. He was immediately returned to his ship as an impostor, was punished, and exhibited no longer any contraction of his ankle.

While transcribing this for the press, a flag-officer of the navy informed the writer that he

was once member of a court of officers who invalidated a seaman on account of a contracted knee-joint, which had resisted all kinds of treatment for a long period. On the day after he was discharged, he was seen walking upright by this officer in the town of Sheerness, and, being pursued, made his escape by a most nimble and active use of his legs.

One mode employed for detecting these pretended contractions is to place a tourniquet on the limb above the joint, by which the muscles are prevented from acting, and the joint becomes in consequence moveable. In cases of marked imposition of this kind, the naval surgeon has sometimes transferred his patients to the captain. In cases of stiff knee-joint, the practice adopted by one disciplinarian was to cause the skulker to be lashed on the back, with small cords, by the boys, until he could *run away* from them. Of course, no surgeon would give his sanction to such treatment.

9. *Deafness*.—Loss of hearing is not unfrequently feigned in the army and navy, and also by persons in civil life who wish to escape a public trial or to excite commiseration. Simulated deafness is, in general, alleged to come on rapidly, whereas the real disability takes place very gradually. Two recruits complained that they had been suddenly attacked with deafness without any previous illness. The state of the meatus was natural, and no sign of inflammation existed. The surgeon first employed the antiphlogistic regimen, and then inserted a seton in the nape of the neck, which was regularly dressed in the morning. In eight or ten days they both declared that they had regained their hearing, and requested to be allowed to return to their duty.* As in the case of blindness, the natural but involuntary language of the countenance generally evinces that the impostor continues to gain intelligence of what is going on around him through the organ of hearing. Cases of this kind are commonly detected by a little stratagem, such as making a sudden noise near the patient, or suddenly mentioning something deeply interesting to him, and watching the effect on his countenance or pulse. Foderé mentions several examples of soldiers who betrayed themselves on hearing a sudden noise. Mr. Dunlop mentions the case of a soldier in the York Military Hospital, who feigned deafness so well that firing a pistol at his ear produced no effect. He was, however, detected by the same experiment made after he had been put to sleep by opium: he then started out of bed.†

Accident also has sometimes led to a discovery of imposture, when there was no suspicion entertained respecting the alleged loss of hearing. A remarkable instance of this is recorded by Sir Walter Scott, in the introduction to *Peveril of the Peak*. A woman pretending to be both deaf and dumb, lived several years in a family, and afforded no

* *Cheyne*.

† *Beck's Jurisprudence*, p. 17.

* *Loc. cit.*

suspicion of being an impostor, until, on an occasion of great surprise, she forgot her part and suddenly expressed her feelings "in loud Scotch." In the same work a beautiful illustration of the manner of detecting the imposture, by exciting strong emotion and watching its influence on the circulation, must be familiar to every reader.

10. *Deaf-dumbness*.—This is a very common imposture among mendicants. It is also not unfrequently feigned in the military and naval service. It is of importance to know, that if a person has ever acquired the use of speech and is able to move his tongue, his dumbness cannot be real. Many singular examples of this imposture are recorded by authors; but the most remarkable is that of Victor Foy or Travanait, detailed at great length by Foderé.* This man, after deceiving a vast number of medical men in different countries, was at length detected by the Abbé Sicard. Dr. Cheyne mentions the case of a soldier who exhibited this disability for no less a period than five years, but recovered his speech upon being discharged from the service. On one occasion this man was accidentally shot in the ear by an awkward recruit, on which occasion he "expressed pain and consternation by a variety of motions and contortions, but never spoke."†

In a case of a seaman on board the *Utile*, who pretended to be deaf and dumb, the surgeon, appearing to be deceived by him, made very formal and ostentatious preparations for an operation upon his throat, and while his attention was thereby engaged, he applied a lighted candle to the man's fingers. He resisted this test, however; and having represented his case to the Admiralty, the surgeon was dismissed his ship for cruel, or at least unprofessional, treatment of his patient. Shortly afterwards, the sailor being still detained in the ship, recovered both speech and hearing. He subsequently pretended to have lost his speech only; but, finding that this faculty was not considered essential to the performance of the severest duties of a seaman, he speedily regained his tongue. This man was of a very different temper from the simpleton of whom Parr speaks. "How long have you been dumb, my good friend?" says a passenger, with the most insidious humanity. "Three weeks, Sir," replied the incautious deceiver.‡

11. *Diarrhæa and dysentery*.—Bowel complaints are sometimes feigned by soldiers and sailors and others, more particularly in countries where dysentery is prevalent, as in India. The motive for simulating this disease is commonly the escape from some particular duty. The imposture is easily detected by obliging the patient to use a night-chair; but care must be taken that he does not borrow, buy, or steal the leading symbol of dysentery, or manufacture it expressly for the occasion. Mr. Hut-

chinson informs us that he has known convicts break down in their urinary utensils a figured motion, and intimately mix it with the urine so as to induce the belief that it was in reality a diarrhæal evacuation;* and one of the writers of this article was informed by a West-Indian planter that the same deception is practised by the slaves in that country to escape labour. He knew an instance of a negro who had nearly rooted out all his teeth by tearing his gums with iron nails, in order to procure blood to make the factitious dysenteric motion more complete. These unhappy persons do not always content themselves with feigning these affections; they actually produce them by deleterious substances taken into the bowels; and Mr. Hutchinson says he has not unfrequently known them fall victims to their own imprudent attempts. It would appear that the seamen under Mr. Hutchinson's care made use of vinegar and burnt cork to effect their purposes. Mucous discharges are produced by introducing suppositories of soap or other irritating substances into the rectum, and these may be subsequently mixed with blood.†

12. *Ear, diseases of*.—A purulent and fetid discharge from the ear has been simulated or induced by soldiers with the usual object of obtaining their discharge or escaping from duty. An instance is mentioned in the *Dictionnaire des Sciences Médicales*, where honey was used to simulate a morbid discharge; and the cheat was very near proving successful. A more common practice is to introduce irritating substances, such as cantharides, into the auditory canal, and thus to excite inflammation and purulent discharge; and to render the discharge more disagreeable, rancid oil and other stinking matters have been afterwards employed. In these, as in so many other cases, careful examination will detect the imposition.

13. *Emaciation and debility*.—An appearance of unsound health is occasionally simulated for the purpose of procuring an exemption from some disagreeable service, or to obtain leave of absence, change of climate, &c. The means commonly employed are abstinence from sleep and food for a considerable time, drinking to excess of strong liquors, and frequently taking small doses of the tartrate of antimony.

Partial emaciation, or wasting of the limbs, is a much more common resource of the impostor, more particularly among mendicants. In the army or navy it is hardly possible for the individual to find time or opportunities to produce the compression by which it is effected. Sometimes, however, the circumstance, not very rare among adults, of one arm being considerably smaller than the other, is taken advantage of, and the impostor pretends that the wasting is of recent occurrence, and is accompanied with loss of muscular power or with pain. The Earl of Gloucester, afterwards Richard III., had an arm of this

* Loc. cit. p. 478.

† Loc. cit. p. 144.

‡ Parr's Medical Dictionary.

* Loc. cit.

† Cheyne, p. 170.

sort, and is related to have taken advantage of it for purposes of deception.

Every one must have seen mendicants at country fairs, exhibiting one or both arms hanging down fleshless and motionless by their sides. Almost all these have been in the first place intentionally produced by long continued bandaging, and the greater number have in reality become powerless.

Partial wasting of a limb may, however, be a real disease; we are not, therefore, to decide on such cases without due examination. In most instances the knowledge of the surgeon will enable him to discriminate between the real and the pretended disability; but we have known instances in which the discrimination was extremely difficult.

14. *Epilepsy*.—This disease is very frequently simulated in the streets. It is also not seldom feigned by soldiers and sailors for the purpose of procuring their discharge. Nevertheless, the practitioner who is intimately acquainted with the pathognomonic symptoms of epilepsy, and pays proper attention to the case, will generally be able to satisfy himself whether an alleged paroxysm of the disease be simulated or not. During a feigned paroxysm of epilepsy the contractions of the different parts of the body do not come on simultaneously; and if a patient be narrowly watched, he will be discovered to open his eyes occasionally for the purpose of observing what effect his exhibition has upon the by-standers. The simulator of epilepsy is unable to produce the red, bloated countenance and contorted face which accompany the real disease, or the immobility of the iris on the access of light. He is also apt to exhibit the appearance of foaming at the mouth either in too slight or in too great a degree. The latter result is produced by a piece of soap kept in the mouth. A marked difference between the real and feigned disease is, usually, that in the latter the patient courts publicity for his exhibitions, and makes no attempt to conceal his malady, while the real epileptic is almost always extremely desirous of hiding his infirmity. It will, likewise, be found on inquiry, that the feigned paroxysm is apt to come on very opportunely to promote the attainment of some object of desire to the patient, while the real disease shews no such intelligent consideration. It is further to be observed, that the skin is comparatively cool when the contraction of the muscles is involuntary; but if the agitation of the body be voluntary, the skin is covered with perspiration. A feigned paroxysm of epilepsy usually terminates much more abruptly than the true disease, and the convulsions are not succeeded by the comatose or soporose state that generally supervenes on the epileptic convulsion.

The most decided proof of epilepsy is, however, an insensibility to the influence of external agents; consequently, when any evidence of sense is excited by stimulants during the paroxysm, it may generally be inferred that the symptoms are counterfeited. For the

purpose of testing the degree of insensibility various means may be tried in doubtful cases. The following are some that have been used by military and naval surgeons, and often successfully.

1. A powerful general shock to the system, as by a pailful of cold water suddenly dashed upon the patient. We have more than once seen this treatment succeed in putting a period to the paroxysm; but we did not always, on this account, satisfy ourselves that the disease was feigned. So powerful a shock is not unlikely to arrest real convulsions.

2. A strong impression made upon particular senses. Mr. Hutchinson mentions a case supposed to be feigned in which the convulsions were instantly removed by blowing "some fine Scotch snuff" up the nostrils through a quill. This induced another fit—a fit of sneezing—that lasted nearly a quarter of an hour; and there was no return of the epilepsy while Mr. Hutchinson remained in the ship. The same practice was tried in real cases of epilepsy by this gentleman, but he never could produce any similar effects, although the patients were not snuff-takers. Dr. Cheyne thinks the most powerful stimulant that can be used in such cases is a few drops of alcohol introduced into the eye, and relates a case where the pretended epilepsy was instantly arrested by it. The introduction of stimulating or very nauseous remedies into the mouth, so as strongly to impress the sense of taste. Stuffing the mouth with common salt, or forcibly introducing a solution of aloes, &c. is thus often effectual in putting an end to the feigned disease.

3. The apprehension of pain or danger, excited by the proposal of an operation in the patient's hearing, or by actually placing him in a situation where he must injure himself if the convulsive movements are continued. We are informed by a naval officer that he once saw a tremendous epilepsy instantly cured by an order being given to introduce a red-hot ramrod into the patient's anus; and the dread of the actual cautery, though in a somewhat less formidable mode, has often proved a powerful remedy in similar cases. Perhaps an equally effectual plan is to *propose* to pour boiling water on the legs, and actually to pour cold water. Dr. Cheyne relates an ingenious expedient put in practice in a case of feigned epilepsy, by Mr. Young, surgeon of the 10th regiment. A large barrack-table was put upon another of the same dimensions, and the pretender placed, in the midst of his paroxysm, upon this elevated bed. The fear of a descent put an immediate termination to the epilepsy.*

In concluding these remarks, we wish to impress upon the mind of the young practitioner that he is not to be too positive in imagining that he will always be able to decide with certainty whether the ostensible epilepsy is feigned or real. In all doubtful cases, it is due to his own character as a man of honour and feeling, and due to the beneficent profes-

* Loc. cit. p. 154.

sion of which he is a member, that he take the side of mercy; and if he is ever justified in denouncing a patient as an impostor, and thereby consigning him to punishment, he is certainly never justified in being himself the instrument of the punishment. Dr. Cheyne, a man of the greatest experience, and distinguished alike for his candour and accurate observation, informs us that he is "in possession of sufficient evidence to prove that real epilepsy has often been considered feigned;" and our own experience irresistibly leads us to adopt the same conclusion.

15. *Excretion of calculi, &c.*—Soldiers sometimes feign this affection with the view of obtaining their discharge, and unwilling recruits to prevent their serving in the army. A fit of nephralgia, or passing of gravel, is even pretended, and an alleged calculus exhibited. A similar imposition is practised by females, and occasionally under such circumstances as render it very difficult to account for their conduct. A most remarkable case is recorded in the Edinburgh Medical Journal (vol. vii.) of "a young lady, of rather high rank," who feigned this disease, and was believed to have excreted, with great pain, a vast quantity of calculi, "not less than several pint measures in two or three years." The rudest chemical experiments proved the pretended calculi not to be of animal origin; they were in fact "common sand and pebble stones." No motive could be assigned for this extraordinary conduct. A similar case in a boy, ten years of age, is mentioned in the Annals of Philosophy, vol. iv. p. 76; and Dr. Thomson of Edinburgh discovered a similar imposition in a woman, by detecting micaceous particles in the alleged gravel.*

A still more common deception perhaps, and one much more extravagant, is the pretended excretion of calculi from the vagina. Many instances of this fact are mentioned by authors, and many others might be added. In a case mentioned in the Medical Comm., vol. iv. calcined bricks were pretended to be passed from the vagina, and some were extracted from it. A case was mentioned to us not long since, of a young woman from whom many fragments of coal were extracted by a surgeon. But the most remarkable instance of imposition that has come to our knowledge is that of a young woman, the daughter of a farmer near Edinburgh, who, after feigning, forming, or sustaining an immense variety of affections, in uninterrupted series, from 1817 to 1830, at length fixed upon the excretion of bone from the vagina as the great and abiding malady. Among the diseases real, feigned, or factitious, which this girl exhibited, were hepatitis, epilepsy, amaurosis, aphonia, deafness, paralysis of the arm, gravel, anasarca, hæmatemesis, irregular convulsions, gastralgia, dyspnoea, vomiting of substances resembling liver and bone, and retention of urine. Bone was first detected in the vagina in 1824, while the surgeon was introducing the

catheter, and from this period an immense quantity was either extracted or excreted; some pieces were even extracted from the bladder. She was admitted into an hospital in 1825, where she still continued to pass bones, believed for some time to be those of an extra-uterine fœtus; but a complete stop was put to the complaint by secluding the patient from all access to such materials. After her discharge the alleged excretion returned. She had an illegitimate child in 1828, and was finally married to a respectable farmer in 1830. Another young woman, in a respectable rank in life, pretended to pass vesicular bodies from the vagina, and many were extracted by surgical aid. At first the disease was considered natural, but eventually it was discovered, by Professor Thomson of Edinburgh, that the alleged hydatids were artificial vesicles prepared from the intestines of a pig. These were so constructed as to resemble a string of beads.

It is hardly necessary to say anything respecting the means of detecting such impositions; it is, however, important that the young practitioner should be made aware of their occasional existence.

16. *Fever.*—This disease is frequently feigned, and also in some degree produced artificially. Soldiers and sailors pretend to have an accession of ague during the night, and present themselves as if in the interval, to the surgeon. Sometimes they simulate the fit at a time when they can be more readily discovered. Dr. Cheyne mentions the case of a soldier who pretended to be in a *chill*, and who was seen to be shaking violently: upon throwing down the bedclothes, however, he was found not in the cold, but in a sweating stage produced by his own exertions. This exposure put an immediate termination to the paroxysm.* Such persons, Foderé says, often imitate admirably the chattering of the teeth of the cold fit. They likewise use means to produce a greater semblance of fever. Great heat and perspiration, and a quick pulse, are produced by strong exercise immediately before the hour of the visit. In the section on disordered circulation, we have noticed various means adopted for the purpose of disordering the action of the heart and arteries, most of which are equally applicable to the production of the disease now under consideration. The skin is sometimes scrubbed with a hard brush to produce redness; and the tongue is very frequently coloured artificially white, brown, or dark, with chalk, pipe-clay, tobacco, brick-dust, and brown soap, &c. according to the convenience or knowledge of the impostor. The sanguinary pirate Loto, who was lately executed at Gibraltar, very nearly succeeded in deceiving his medical attendants by simulating fever, colouring his tongue brown, &c. In all these cases close observation will almost always detect the imposture; and most certainly a few days' confinement will do so. It is only an ephemeral fever that can be feigned with any prospect of success.

17. *Fracture.*—We have seen several sol-

* Beck's Jurisprudence, by Dunlop, p. 7.

* Op. cit. p. 175.

diers who simulated lameness, and alleged that a thigh bone had been fractured, by which means the limb had become shortened. This imposture is easily detected by placing the man upon his back and examining both the thighs: the muscles of the limb falsely alleged to be shortened will be found hard and in full action, while the muscles of the other limb are inactive and soft. We happened to know one instance of a soldier who obtained his discharge by alleging that he had a plate of metal in his skull, which he said had been introduced there in consequence of the bone having been fractured; and we are also aware of an instance where a medical officer was found fault with for having approved of recruits "with plates introduced into their heads." The simulators of this disability must have met with very credulous auditors, for it is to be presumed they did not examine the heads said to be thus mended.

18. *Hæmatemesis*.—This affection is readily simulated, and frequently has been so by soldiers, sailors, slaves, and other persons. It is effected by procuring blood, and after swallowing it, producing artificial vomiting, whereby it is disgorged. The blood is generally that of some animal; but slaves in the West Indies have been known to swallow their own blood to effect their object. A remarkable case is mentioned by Sauvages, of a girl who feigned hæmatemesis to escape from a convent, and who brought up in the presence of the physician several pounds of blood on several successive days. It was at last discovered that she secretly drank bullock's blood before the visit.* This imposition will in general be discovered, at least in situations where the medical attendant may reasonably expect to meet with feigned diseases, by narrowly examining the symptoms—when a discrepancy and want of harmony will be found among them which nature never presents. When any suspicion is excited, the detection may be made at once by watching the patient, and cutting off the possibility of his obtaining the materials necessary to the simulation.

19. *Hæmaturia*.—This disease has been sometimes simulated by taking substances into the stomach which have the quality of reddening the urine, such as beet-root, the fruit of the prickly pear, madder, &c.; it has, however, been much more frequently attempted to impose by mixing foreign substances with the urine, particularly blood, after it was excreted. The authors of the article *Feigned Diseases* in the *Dictionnaire des Sciences Médicales* inform us that blood has even been injected into the bladder with this view. A little attention suffices to discover factitious hæmaturia, however produced.

20. *Hæmoptysis*.—This is a disease very commonly feigned by soldiers and sailors, and also by mendicants. The cough is easily assumed, and the sanguineous expectoration is produced by pricking or cutting the gums, throat, or some part of the mouth, or by cut-

ting the fingers or arm and sucking the blood, or by procuring the blood of animals, or by artificially tinging the sputa of a red colour by some foreign substance. Sylvaticus mentions the Armenian bole as being used for this purpose;† Dr. Beck, brick-dust; and Mr. Hutchinson vermilion paint. Dr. Cheyne justly observes that the absence of the symptoms which generally attend real hæmoptysis, such as cough, dyspnœa, fever, &c. will naturally excite suspicion, and the appearance of the sputa will confirm this in such cases. The factitious will be very unlike the real sputa of hæmoptysis. The use of the stethoscope will greatly aid in the diagnosis in doubtful cases. It ought to be a rule in the army, that simple spitting of blood, unaccompanied by signs of organic disease of the lungs, is not a sufficient cause for the discharge of a soldier.

21. *Hæmorrhoids*.—The discharge of blood from the anus is easily feigned or imitated. It appears also that hæmorrhoidal tumours have been very artfully constructed by means of small bladders, inflated and tinged with blood, and attached to a substance introduced into the rectum.‡

22. *Hepatitis*.—This affection is often simulated by soldiers who have been some time in India, when they wish to be discharged. They are commonly well acquainted with the symptoms of the disease, and frequently tell a tolerably consistent story. The countenance and general appearance of an impostor of this kind are, however, often at great variance with his oral testimony. In doubtful cases of alleged organic disease of the chest or abdomen, the person to be examined should be undressed, as he is then unable to conceal whatever evidence of health may be supplied by a plump frame and muscular limbs. An opportunity is also thus afforded of properly exploring the cavity in which the disease is alleged to have its site.

It is not an uncommon practice with officers in the navy on foreign stations, who are desirous of returning to England, to feign some disease in order to be invalided to a more temperate climate. In the West Indies in particular, this practice was formerly of frequent occurrence; and it is a curious fact that the disease most frequently assumed, and successfully, was that now under consideration, and which is by no means very common among sailors in that country. The causes of this preference in favour of hepatitis are, no doubt, the supposed facility of imposing the belief of its existence on a superficial observer, and the generally received opinion of the tendency of all tropical climates to generate it.

The fact just stated might lead to some curious statistical mistakes. Suppose, for instance, information were sought respecting the relative prevalence of different diseases in different climates among persons in the navy. If the official records of the medical department

* *Institutio medica de iis qui morbum simulant deprehendendis*.—*Madrid*. 1594.

† *Percy and Laurent*, op. cit.

* *Nosol. Method. t. ii. p. 299*.

were inspected for this purpose, it would be found that a large proportion of the invalids from the West Indies were affected with hepatitis; and it is probable that the proportion might be greater than among the invalids from the East Indies. Now there cannot be a doubt that liver-disease is, in truth, *much* more prevalent in the latter climate than in the former. Owing to particular circumstances those invalidated for complaints of this kind from the West Indies are chiefly officers; and the much greater proportion of this class than of common seamen, in the invalid lists, might be considered as indicating some peculiar causes of hepatitis among officers in that country.

Dr. Cheyne has some very sensible remarks on the feigned hepatitis of soldiers. He says that "when men who have not been in warm climates obstinately complain of pain in the right hypochondrium, and when we cannot discover any enlargement or fulness of the liver, when the pulse and breathing are undisturbed, the secretions and excretions natural, and when the alleged pain resists topical bleeding and blistering, and mercurial purgatives, the sooner we send them to duty the better." Persons in this class often eventually succeed in their object of dismissal from the service, chiefly from the mistakes of the surgeon. "Such subjects," says Dr. Cheyne, "have often come under my care with their flesh and strength reduced by repeated courses of mercury, their gums absorbed, and teeth shaking in their sockets, whose livers were sound (probably they never were otherwise), but whose broken health required that they should be invalidated without delay."*

23. *Hernia and Hydrocele*.—Both these diseases have been frequently simulated. The means most frequently used to effect the object, is inflating the cellular substance of the scrotum. But more artful and more severe means have been adopted. Cases are related in the Act. Nat. Cur. of inflated bladders being applied to the scrotum to impose on the ignorant; and it is to the great discredit of the medical profession that some of its members have aided in the production of deceptions of a more scientific description. In the year 1828, two medical men were tried in France for having, respectively, produced in four conscripts swellings of the testicles. It was sworn by one of the conscripts that the operator injected into a wound made by him in the scrotum, a red-coloured liquid which gave him excessive pain. The operation was followed by violent inflammation of the testis. The other operator applied caustic to the scrotum with the same result. This last individual, a surgeon of the name of Desplats, was sentenced to the pillory and five years' imprisonment. The practice of inflating the scrotum is much more common, because more easy. Sir Astley Cooper mentions the case of a man at Norwich who imposed on the surgeon by this means, and thus escaped serving in the army: and we have more than once seen the same plan adopted,

but without success, by impressed seamen. A small blow-pipe, or the stalk of a tobacco-pipe, is the instrument commonly used. It is hardly necessary to say that no surgeon *ought* to be deceived by a case of this kind.

Some men have the power of retaining the testes in the groin by the voluntary action of the cremaster muscles; and the swellings resulting from such a position of the parts have been mistaken for hernia.*

24. *Hydrocephalus*.—Chronic hydrocephalus has been simulated at least in one case which we shall quote from Sauvages, who terms the case, after Mangetus, *physocephalus artificialis*. In the year 1593, a mendicant exhibited his child for gain as a monster, on account of the immense size of his head. This preternatural appearance was produced by the daily insufflation of air under the scalp, by means of a pipe introduced into a small perforation on the vertex. By this operation, repeated for several months, the scalp at length became extended to an enormous degree. Being detected, this wicked father was condemned to death.†

25. *Hydrophobia*.—One would hardly expect that this disease should ever have been feigned. MM. Percy and Laurent, however, mention a case of the kind in a conscript, which, although terrifying the examiners at first, was eventually cured by the threat of suffocation between two beds.

26. *Incontinence of fæces*.—We have known this disease feigned. A boy on board the *Desirée* frigate pretended that he could not retain his fæces, and was frequently found voiding them on all occasions and in all places. Being deemed an impostor, he was severely punished, and at last confessed that he had been advised to do so by his aunt, that he might be discharged the service: this result he was very near obtaining. The following remark of Dr. Cheyne, relative to this pretended malady, is very judicious. "When a patient alleges that he cannot retain the contents of the bowels, the sphincter ani ought to be examined, and if it contracts upon the finger, opium, with solid food, must be prescribed, and a watch set over the individual: if he passes solid fæces in bed, he will be a fit subject for a court martial."

27. *Incontinence of urine*.—It is somewhat singular that a disease so very rare as this is among persons not advanced in life, should be one very commonly feigned, more particularly by soldiers. This arises, probably, from the circumstance that the infirmity is easily simulated, and is one particularly inconsistent with the habits of neatness and cleanliness required in a modern soldier. This disease was extremely common among the French conscripts during Napoleon's wars. Its very frequency of occurrence among soldiers is in itself a strong presumption of imposition; and if it makes its appearance at all in an epidemic form, we may be almost certain that it is feigned. MM. Percy and Laurent say they have had no fewer than fifteen pretended cases of this

* Loc. cit. p. 172.

* Hutchinson, loc. cit.

† Nosol. Method. t. ii. p. 497.

kind at one time in a recruiting dépôt; and Foderé witnessed its occurrence, almost in an epidemic form, in consequence of two soldiers having obtained their discharge on this account. Dr. Cheyne notices a somewhat similar circumstance in an English regiment, in consequence of the facilities the soldiers found in imposing upon a practitioner unacquainted with military practice.

Independently of evidence derived from collateral circumstances, there are many means of detecting simulated incontinence. When the disease is real, the clothes of the individual usually exhale a strong ammoniacal odour, which is not often the case when the disorder is feigned. The simulator commonly chooses the time and place which appear to him the best for wetting his clothes: if he sleeps with another person, he is more apt to wet his bed than when he sleeps alone; and if he is furnished with clean straw to lie upon, he does not commonly wet it before the morning. In real incontinence, more especially if it has existed some time, the glans penis is stated by MM. Percy and Laurent to be pale and shrivelled, from being kept constantly wet with the urine which comes away *guttatim*; and Foderé says if a ligature be passed round the penis in such cases, the urethra will soon be found distended above it. It is evident, however, that this test cannot be depended upon. In the Austrian army, a man who alleges that he has incontinence of urine is furnished with a urinal and obliged to do his duty. In the French army it was customary to compress the penis between two pieces of wood; and Foderé informs us that he succeeded in putting a stop to a fictitious epidemic of this kind by applying a sealed ligature to the penis, which was only allowed to be undone by a person appointed for the purpose. MM. Percy and Laurent prescribed with perfect success in a case of this kind, twenty lashes on the loins, with the avowed object of strengthening the debilitated part; and the surgeon of a regiment mentioned by Dr. Cheyne, speedily put an end to a pretended epidemic of the same kind by prescribing a cold bath twice a day in Lough Neagh. Such means as these, with blisters to the perineum, and other appropriate but disagreeable remedies, will almost always put an end to this alleged disability, even when we have not been able to demonstrate to the simulator himself that we have detected him. When this is once effected, there is never any difficulty in curing any feigned disease. The most effectual mode of detecting simulated incontinence is that prescribed by Mr. Comyns, an army surgeon, and afterwards by Dr. Hennen and Mr. Hutchinson, viz. to administer a strong opiate at bed-time, and to watch the length of time the urine is retained during sleep; or to introduce the catheter unexpectedly, to ascertain the quantity of urine found in the bladder. In real incontinence, the bladder will not retain its contents after a certain time during sleep, or under any other circumstances. The following ingenious method was successfully used by an army surgeon to detect and

cure a fictitious infirmity of this kind. The surgeon having ascertained from the patient how long he could retain his urine, (of course a very short period,) caused him to undress and stand before him with the abdomen exposed. Upon observing the abdominal muscles called into action to aid in the expulsion of the urine, he suddenly and forcibly thrust his fingers against the belly so as to prevent the voluntary muscular effort. This he repeated as often as he saw the action renewed, until the alleged period of expulsion was long passed. He then dismissed the patient with the remark that he had retained his urine long enough to enable him to do his duty.

The opposite state of *retention of urine* has been sometimes feigned, more particularly by female convicts. A strict watch will always detect such an imposition.

28. *Jaundice*.—The yellow colour of the skin in this disease has been simulated by painting it with an infusion of curcuma or tincture of rhubarb, &c.; and it is said clay-coloured stools have been imitated to perfection by taking daily a small quantity of muriatic acid. What it is impossible to feign or to form, however, is the yellow colour of the conjunctiva, and the want of this will always detect the imposition. It will rarely happen that a simulator will be so ingenious as to produce, at the same time, the yellow skin, the pale stools, and the dark-coloured urine. An ingenious device for altering, at least, if not rendering yellow, the conjunctiva, was that of a French conscript, who always put snuff in his eyes before the surgeon's visit.*

29. *Madness*.—Mental derangement, in some of its forms of idiocy, melancholia, or mania, has been in all ages assumed as a means of attaining certain objects of desire. The names of many persons famous in ancient and modern times are associated with this imposture. Madness is most commonly feigned in civil life by prisoners to escape punishment. In the army and navy, and among slaves, it is feigned with the same object, as well as to escape from disagreeable labour; but in the army and navy it is still more commonly feigned with the view of obtaining a discharge from the service. In the latter department of the public service, during the late war, in which so many hearts were broken by the hope too long deferred of returning home, every surgeon of experience met with instances of simulated insanity; and it was equally common among the numerous prisoners of war detained for so many years in this country. All the forms of disordered intellect were feigned; but the most common was that of furious madness, assumed with the view of effecting a temporary purpose, such as the evasion of punishment, the removal to an hospital, &c. When the design was to obtain a discharge from the service, melancholia or idiocy was the form adopted. In several instances the simulators succeeded in gaining their ends; in many others they were detected; and we fear that in not a few instances real

* Dict. des Sciences Méd. loc. cit.

insanity was mistaken for feigned, and the patients were treated as impostors. This fact ought to lead the medical officers in the public service to study with great care the indications of insanity, and ought moreover to induce them, wherever there is a shadow of doubt, to lean to the side of mercy. It is infinitely better that they should be deceived, than that a poor wretch, already suffering under the most grievous of natural calamities, should undergo additional misery from their ignorance.

The discrimination of the fictitious from the real disease is not always so easy as those who have never witnessed both are apt to imagine. It is true that when we consider the very peculiar and complex phenomena which characterize true madness, and reflect on the general ignorance of those who attempt to imitate them, we have no right to expect such a finished picture as could impose on persons well acquainted with the real disease. And yet when, on the other hand, we consider how imperfectly the operations of the intellect, both in a state of health and disease, are known to medical men in general, and how few opportunities the medical officers in the public service have of observing the phenomena of insanity, and reflect how natural it is for the feelings of honourable men to take the part of ostensible distress, it need not surprise us that the pictures drawn even by such rude hands have imposed on educated minds. But it is less because fictitious madness has been treated as real, than because real madness has been treated as fictitious, that we are so anxious to direct the attention of junior medical officers in the army and navy to the study of the characteristic features of the disease. These can be only thoroughly studied in the receptacles for the insane, but much knowledge of importance may be derived from books. Referring the reader to these sources, we must content ourselves in this place with a few general observations.

The form of madness that can be assumed with most facility is that of furious mania; and yet the cases of this which we have witnessed have been all lamentably defective as imitations of nature. The actors always overdid their part. They sought to personify the notion of madness usually entertained by the vulgar, viz. the total abolition of the rational faculty, instead of its partial perversion. It is still more difficult to simulate the quiet half-rational insanity of the melancholic or monomaniac; as nothing but careful observation of persons so affected can qualify an individual for such a difficult task. This statement might be illustrated in a curious and interesting manner by a reference to the writings of poets and novelists. Such persons are obviously much better qualified to paint the disease now under consideration, than the ignorant soldier or sailor; and yet it would not be difficult to point out, in the numerous delineations of insanity presented by authors, such glaring deviations from nature as could not fail to strike any one versed in the history of the disease. Shakspeare, Goëthe, and a few others

perhaps, might stand the application of the severest test; but the common class of writers who have attempted such delineations have failed completely.

Idiocy has been more successfully imitated; and, perhaps, this may be accounted for by the opportunities which most men have enjoyed of studying the character in the instance of the poor idiot, still to be met with at large in almost every village. Conscripts have pretended that they were incapable of being taught the commonest duties of a soldier; and we knew an instance of a young *player*, drafted into the army, who acted the part of an idiot so effectually that he soon obtained his discharge. Almost immediately after this he enlisted into another regiment, and then deserted.

Independently of the mental phenomena of insanity, there are many physical conditions of the system often present in this disease, which it is hardly possible to feign, such as the expression of the countenance, the state of the eye, of the tongue, &c. One very common symptom, and one indeed invariably present in the earlier stages of furious mania, and in most of the forms of monomania, is sleeplessness; and this it is hardly possible for any man to feign. A real madman will be many days, even weeks, without sleep. This circumstance alone, if properly taken advantage of, will suffice to detect most impostors; and in order to derive from it all the advantages which it is capable of yielding, a strict and uninterrupted watch should be kept on all patients who are suspected of imposition. In the case of a seaman who enacted under our own eye the part of a furious maniac, in hopes of escaping punishment, sound sleep overpowered him on the second night of his attempt. Abstinence from food is another circumstance respecting which there will often be observed a marked discrepancy between the real and the pretended madman.

A strict watch will also generally detect in the simulated disease, great variations of violence, incoherence, or other symptoms, having reference to the visits of the medical officer, the being overlooked, &c. A pretended maniac will often be tranquil when he believes himself alone, or only in the presence of those of whose opinion he is regardless. A bold and clever dissembler will, however, not leave himself thus exposed to detection. We are informed by a gentleman, once in charge of French prisoners of war in this country, that he has known men (afterwards detected and admitted on their own confession to be impostors) carry their simulation to so exquisite a height as to eat their own excrements, even when shut up in their cells, suspecting they *might* be overlooked.

Real madness is seldom sudden in its attack; feigned madness very generally is so. The real disease usually exhibits itself at first in slight and almost imperceptible deviations from the habitual modes of thinking and acting, not reaching its height in many cases until after a progressive increase of months, or even years; although, perhaps, the change at last

from a comparatively slight degree of hallucination to extreme violence has been sudden. The feigned disease, on the contrary, is rarely preceded by such indications, but bursts out in full violence at once upon the application of some exciting cause. And yet this rule is not without exception in both cases. We have seen instances of sudden and furious insanity in civil life without any premonitory sign.

The circumstances under which the alleged insanity has supervened, the man's previous character, the probability or improbability of the disease being assumed, and many other obvious considerations, will all materially assist the diagnosis. For instance, if we find a man not previously liable to be so affected, nor hereditarily disposed to insanity, suddenly exhibit the appearance of this disease under an impending trial or punishment, or other threatened evil, which might be averted by such a state, there is certainly a presumption in favour of the disability being feigned. It is however to be borne in mind, that the very same apprehension of exposure, disgrace, or punishment, which affords motives for simulating insanity with the view of escaping them, may give rise to the real disease. Instances of this kind have been mentioned to us as occurring in the public service, and it would be easy to supply others from history and the records of jurisprudence. For this reason, and because we believe with Dr. Cheyne on other grounds, that "we are in more danger of supposing insanity simulated when it is real than of considering that disease to be real when it is only pretended," we must strongly protest against the decision in any case, that the disease is feigned, solely because there appears a strong reason for its being so. Taken in conjunction with the actual phenomena and other collateral circumstances, the consideration of the probable motives will, however, no doubt, in many cases greatly aid the diagnosis.

The existence or non-existence of causes known to predispose to insanity will be considered in every particular case, and they will have their due weight. Of this kind are previous attacks of the same malady under circumstances where there existed no apparent motive for deceit; the existence in the patient's family of a similar disease; eccentric habits, or what may be termed the maniacal temperament; a decidedly strumous habit; the application of strong exciting causes of a moral nature; physical disorders, especially such as are known to affect the brain, as prolonged intoxication, previous injury of the head, the repression of cutaneous eruptions, &c. &c.

It is well remarked by Dr. Cheyne, that in real insanity there is often the greatest insensibility to decency, propriety, and comfort, evidenced by the grossest language in persons previously of very pure minds, by exposure of the person, spitting heedlessly in all directions, passing the excrements in bed, or plastering them on the walls of the cell, &c. circumstances not likely to exist, at least in the same degree, in simulated cases. Yet this only affords us collateral aid in the diagnosis.

Foderé has related the case of a young woman, undoubtedly a pretender, who committed every kind of indecency in her cell; and the miserable trait formerly noticed of a prisoner of war devouring his own excrements, is a convincing proof that nothing is too disgusting to appal a determined will.

In addition to the means of diagnosis supplied by the actual phenomena of the malady, by its previous history, and by other collateral circumstances, we have, in suspicious cases, a very important means in the institution of plans calculated to outwit an impostor or to overcome his obstinacy. Many harsh measures have been had recourse to in the army and navy with this view, which are altogether unjustifiable, except in cases of the clearest imposture. In no case, however suspicious, is the medical practitioner authorized to go beyond the employment of means of a strictly professional kind. He may, indeed, use all the artillery of annoyance supplied by medicine, and he may even *threaten* extra-professional infliction; but he must never go beyond this line. When convinced of the imposition in the case of a soldier or sailor, it is the duty of the medical officer to state his opinion to his military superiors; the *punishment* of such a crime is altogether foreign to his station and profession. Still, both the threat and the actual infliction of punishment have often put an end to simulated madness. In a case which occurred in the navy, a sailor who evinced a great desire to throw himself overboard, but was for a time prevented, at length succeeded in doing so; immediately on reaching the water, however, he began to swim vigorously, and called loudly for a boat. Upon being taken on board his madness had disappeared, and it did not return. The practice of former times would sanction a conjecture that this might have been a case of real insanity cured. In the case of the girl mentioned by Foderé, his informing the keeper in her presence that on the morrow a hot iron would be applied between the shoulders if she was not better, was immediately followed by great amendment. Actual punishment has often been advised, and even employed, where there existed merely suspicion of imposture; and, although condemning the practice, we must admit that it has frequently been successful in detecting deceit. Zacchias relates a case in which a physician recommended corporal punishment, on the principle that, if the madness were simulated, the cheat would not stand the test, and if it were real, the flagellation would do good as a derivative; and the event proved the accuracy of the first opinion.* The same means, however, and others equally severe, have often been employed without such a fortunate result, in equally suspicious cases. Examples of this sort, we have reason to know, were by no means extremely rare in the army and navy during the late war. A melancholy instance of real insanity treated as feigned is related in Mr. Marshall's Hints to young medi-

* Foderé, p. 460.

cal Officers (p. 140 ;) and we could enumerate others of a similar kind which occurred in the navy.

Some cases have come to our knowledge where deception was believed and punishment inflicted, yet, in which evidence of the reality of the disease was most conspicuous. In one of these, which occurred on board H. M. ship —, two circumstances ought at once to have opened the eyes of the surgeon, viz. the periodical recurrence of the affection, and the total sleeplessness that prevailed during the paroxysm. They were also, we suspect, much less uncommon in civil life formerly, when the execution of the laws against vagrants was more summary than at present.

In this, as in all other feigned diseases, impressing the impostor with the hopelessness of his attempt to succeed in gaining his object, will be found the most effectual means of putting an end to the simulation. A few words intentionally dropt in the patient's hearing, but as if incidentally, expressive of the expectation entertained by the medical attendant that the case would be cured, and of intended perseverance in the treatment then pursued, have often proved prophetic. We have known instances of a stop being almost immediately put to simulated madness by sending the soldier to the dépôt for the insane.

It is fortunate that the very treatment most suitable to the recovery of persons really deranged is that which is most intolerable to the impostor. None but the most determined characters will be long able to resist the horrors of solitary confinement, bread and water, and the constant pain of blisters and other counter-irritants. Seclusion is particularly necessary in all such cases, as nothing tends so much to keep alive the hopes and the courage of the impostor as the consciousness that his raving is heard by his fellows, and the belief that an impression favourable to his views may be made on the minds of his officers, by the continued exhibition of his miserable state.

30. *Malformation*.—Deformity, such as curvature of the spine, elevation of one shoulder, shortness or distortion of a limb, inversion of the feet, &c. are occasionally simulated by soldiers, and sometimes with so much success that they obtain their discharge on that account. It may be said that a man who feigned deformity would readily be exposed by a medical practitioner who is intimately acquainted with the healthy configuration of the human body. This opinion seems to be well founded, yet cases occasionally occur from which it would appear that a simulator of deformity is not easily detected. We are acquainted with more than one instance where a board of medical officers have recommended recruits to be discharged from the army on account of alleged great deformity, but who were, in fact, remarkably handsome well-made men, and afterwards enlisted and were approved for service.

31. *Needles in the body*.—Among the various factitious disabilities, induced or voluntarily submitted to by patients, the singular one

of the introduction of needles into some part of the body deserves particular notice. The two following cases will point out the character of this affection.

In July 1818, a young woman was admitted into Richmond Hospital, Dublin, on account of a painful swelling of the left hand and arm, somewhat resembling that which occurs in phlegmasia dolens. The inflammation continued to increase, diarrhoea supervened, and her general health became greatly impaired from the constant pain and irritation of the disease. Amputation was performed close to the shoulder-joint on the 21st of September. On examining the arm, eight or nine needles were found in the palm of the hand and forearm. The cause of the inflammation was now evident. This woman eventually confessed that she herself introduced the needles into her hand and arm, and she would assign no other reason for so doing but that she was tempted by the devil. An unwillingness to labour so as to procure a livelihood seems to have been the efficient cause of her exciting inflammation for the purpose of being admitted into an hospital. For several years after her arm was amputated she was employed in Richmond Hospital as a servant.*

The case of Rachel Hertz is perhaps still more remarkable. At about the age of fourteen, on the 16th of August, 1807, this woman became a patient of Professor Herholdt of Copenhagen. From this date until February 1819, she suffered under a variety of anomalous complaints; and especially an affection resembling hysteria, or epilepsy, or both. About this time a tumour appeared near the umbilicus; and being opened, a needle was extracted from it. From the 12th of February, 1819, till the 10th of August, 1820, a period of eighteen months, this woman had a number of abscesses formed in different parts of the body, from which two hundred and ninety-five needles were at different times extracted. Her superior and inferior extremities became paralytic, and continued so for a long period; but she eventually recovered. Swellings, or abscesses, containing needles, continued to appear from time to time; so that from the 28th of May to the 10th of July, 1822, one hundred were extracted, altogether amounting to three hundred and ninety-five. It was supposed by Professor Herholdt and Dr. Otto that she had swallowed the needles during her paroxysms of hysteria or epilepsy; but the truth was ascertained in a very simple manner. A young girl was observed in the act of introducing needles under the skin of her arm; and being asked who had taught her that trick, her answer was, that she had seen Rachael Hertz introduce needles under her skin.

32. *Ophthalmia*.—Factitious ophthalmia is, we believe, rare in civil life. It was very frequent among the French conscripts during the late war; no fewer than twelve per cent. of the inefficient conscripts belonging to the depart-

* Phrenological Journal, vol. ii.

ment of the Seine, during a period of ten years, were rejected on account of "impaired vision—diseases of the eyes." During the first ten or fifteen years of the present century, inflammation of the eyes prevailed to a great extent in some regiments of the British army, and there is much reason for supposing that factitious ophthalmia was then frequent. The following is one of the most extensive instances of factitious ophthalmia that has come to our knowledge. In the year 1809, three hundred of the men of two regiments which were on duty at Chelmsford, became affected with ophthalmia. The healthy men of the corps were removed to another station, and the sick remained in hospital, but under military command. Information having reached their commanding officer that one of the nurses of the hospital was in the habit of going to a druggist's shop for the purpose of purchasing medicines, suspicions were excited; and in conjunction with the medical officer in charge of the hospital, he made a successful attempt to discover whether the men had any drugs in their possession which might be employed to excite inflammation of the eyes. Accommodation having been provided for about twenty-four men, the number contained in one ward, at midnight the officer made his appearance in the hospital; the men were roused from their beds and forthwith marched in a state of nudity to the new ward. The old ward was secured for the night; and next day when the beds were examined, a number of small parcels of corrosive sublimate were found concealed. Means were taken to prevent a supply of this article, and in a very short time two hundred and fifty of the men had recovered, and were then marched to their respective corps.

The means that have been known to be used by soldiers to produce ophthalmia, besides the above, are powdered alum, snuff, salt, lime, tobacco-juice, &c.; also, mechanical irritation of the eye by hard bodies, extraction of the eye-lashes, &c. Presumptive evidence is, in general, all that can be obtained respecting the production of this disease; but many circumstances are calculated to excite suspicion in the situations where it is likely to exist. Among soldiers it has been found that the *right eye* has suffered chiefly, because this is the important organ to a modern man of war. The extreme rapidity of the progress of the inflammation in the factitious ophthalmia is often a guide to the real nature of the disease: it sometimes reaches its acmé in a few hours, a circumstance never observed in the natural disease. It is much more difficult to detect the disease in a chronic state. It is not improbable that the destruction of the eye among soldiers has been promoted by the large pension which government has allowed to those who are discharged on account of impaired vision. Formerly every man who became blind of one eye was discharged and received a pension for life of annuence per day. This usage is, however, amended in the new pensioning warrant; for it is there ordered that "no soldier

shall be discharged for the loss of one eye, whether it be the *right* or *left*." This regulation, if put effectually in execution, will in all probability lead to a great diminution of the prevalence of ophthalmia in the army.

When the disease is once detected, the cure of it is obvious; but much difficulty is often experienced in putting an end to it where it is merely suspected. When perfect seclusion cannot be obtained, as in the navy, a strait waistcoat has been used to prevent the patient tampering with his eyes.*

33. *Pain*.—There is perhaps no morbid affection more frequently feigned than this; among the disabilities assumed for the purpose of obtaining a mere temporary object, there is certainly no one so often met with. It is the usual resource of the worthless and mean-spirited among soldiers, sailors, and slaves, to obtain a few days' respite from labour. The vulgar see little in real disease but pain, or they at least look upon pain as the common symbol of disease, which they regard as something superadded to and existing separately in the body. They constantly describe any chronic ailment as an entity; "it goes here, it flies there, it works in the bowels," &c. These flying or migratory pains are very common among soldiers and sailors, and are known by the cant name of "*the all-overs*;" they are readily detected by a little art. If the surgeon listens attentively to the narrative, and begins to catechise his patient with apparent simplicity and good faith, he may bring him to admit the existence of any symptom however absurd, and thus to betray himself.

By the more cunning and more resolute the existence of severe pain, fixed in some particular spot, is feigned with more success, and often indeed with astonishing constancy. Many instances are recorded, and several have come to our own knowledge, where individuals have supported their assumed character for a long period, under every privation and much real suffering. A remarkable case of alleged pain in the mamma, in a female mendicant, is related by Lentin,† which could only be admitted as feigned on the clearest evidence. This woman went so far as to solicit, and at length to obtain, the amputation of first one mamma and then the other; and, not content with this, she afterwards wished one of her hands to be amputated on account of a similar pain, of which she alleged it to be the site. This woman was proved to be an impostor in respect of part at least of her alleged maladies; and she was considered by Dr. Lentin and other competent judges as equally so in regard to the pain. The following cases related by MM. Percy, Laurent, and Foderé, are remarkable examples of the same kind.

A young man having been deceived by a recruiting officer, who promised that he should be made an ensign on his joining the regiment,

* Hutchinson, loc. cit.

† Beytraege zur ausubenden Arznei wissenschaft, Leipz. 1797.

formed the resolution of attempting to obtain his discharge by simulating disease. He complained of having a deep-seated pain in the left knee-joint, on account of which a great variety of remedies were applied, including blisters and moxa. The leg became by degrees extenuated, and he was sent to the baths. At last, after being four years under medical treatment, he obtained his discharge. Upon leaving the hospital, some of his comrades accompanied him a little way on the road, whom he treated with wine; and before they parted he took off the wooden leg he had worn for three years, and threw it into the fire, saying, at the same time, "they deceived me, and I in my turn have deceived them."

A soldier came under Foderé's care in the hospital of Martigues, complaining of a violent pain in the left leg, which he represented as arising from his having slept on the damp ground. During a period of eight months the most severe and painful external applications were made, and medicines given internally without effect. He still continued in bed, being unable, as he said, to stand. The leg having become wasted from the repeated use of blisters and issues, and apparently shorter than the other, and he being moreover pallid and emaciated in consequence of the severe regimen to which he had been subjected, Foderé at length obtained his discharge. While waiting for this, however, he was one day detected marching without any assistance, and, being taken up, at last acknowledged the imposition.*

Pains are also frequently feigned in the internal cavities of the body; and probably these may often be more easily detected than such as are alleged to have their site in the external parts, inasmuch as pains of a simply nervous character are perhaps of less frequent occurrence in the former situation, and pain depending on other causes will be accompanied by other appropriate symptoms. Still it must be admitted that detection in cases of this kind is more likely to be obtained through means of collateral evidence than by the absence of positive and sensible indications of disease. Every experienced practitioner has witnessed cases of most severe pain in almost every part of the body in persons who could not be suspected to feign; and the whole history of that great and increasing class of diseases termed *Neuralgie* is but a melancholy testimony in favour of the possibility of real pain being unmarked by any certain external signs. Too often, we fear, has the absence of symptoms in such diseases been the cause of great additional suffering to the victims of neuralgia in the public service; and we cannot more emphatically impress on the mind of the young medical officers in the army and navy the necessity of caution in such circumstances than by relating the following cases.

A young soldier, under the care of Foderé, complained of violent pains in various parts of

his body, now in one limb, now in another, in the chest, head, &c., unaccompanied by any other symptom. Considering these pains as fictitious, Foderé refused to give the man his discharge; but he nevertheless died in the hospital without any new symptom. "After his death," says Foderé, "I anxiously explored, by means of the scalpel, all the old seats of the pains, but could discover nothing, in the membranes, the muscles, the nerves, or the viscera; and I was forced to believe that life had been destroyed by the long continuance of the pains. Since then," the author adds, "I have often preferred rather to be too lenient than to run the hazard of being again unjust."*

A seaman on board one of His Majesty's ships applied to the surgeon, complaining piteously of a pain in his shoulder preventing the motions of the arm. He could assign no cause for it, alleging that it came of itself and gradually increased to its present violence. No external mark could be discovered, and it being suspected to have arisen from some slight strain, it was ordered that the part should be rubbed with a common liniment. This was continued for a fortnight without relief; blisters were then applied and kept up for another fortnight. There still appearing no external sign of disease, the surgeon, suspecting imposition, ordered the man to move his arm before him. The poor fellow hesitated, and, begging to be spared, was allowed to rest for a few days, when the arm was forcibly moved by another person. It was in vain that the man entreated them to spare him; the surgeon, confident in his fancied knowledge, and resolved to punish what his nosology told him was imposture, ordered a rope and a weight of eighteen pounds to be brought; he was commanded to swing the one, or to bear from the other the punishment which his alleged *crime* deserved. He implored, he hesitated; when the rope, laid on with no slight hand on his shoulders, made him seize the weight; but scarcely had he freed it from the deck when he was forced by pain to throw it down. This scene was exhibited for some time, and sullen resentment at length getting the better of patience, gave additional force to the surgeon's opinion. The man was about to be returned to his duty, and to be punished as an impostor, when a fatal evidence appeared to testify against the sentence of his cruel and ignorant judges: a slight swelling showed itself on the part with signs of fluctuation; it was laid open, and purulent matter, to the extent of nearly two pounds, was discharged! In this case, which we know to be authentic, ignorance was as conspicuous as barbarity. Such a scene could hardly occur in these days, and we heartily trust it never may in those which are to come.†

34. *Paralysis*.—Palsy is frequently pretended among mendicants, and it is also occasionally

* Méd. Légale, t. ii. p. 471.

† See Med. and Phys. Journ. for January 1808, vol. xix. p. 1.

* Op. cit. p. 473.

feigned in the army and navy. The pathognomonic symptoms of palsy commonly involve some organic alteration, which it is scarcely possible for a man to simulate with success if his case be carefully investigated by well qualified persons. The fact, however, that impostors have been successful, is a sufficient warning to medical practitioners to devote much attention to the examination of doubtful cases. Coche, a French surgeon, who has given much of his attention to feigned diseases, says, "la simulation de cette maladie (palsy) n'est que ridicule;" but experience has proved that, however ridiculous, it has often been successfully practised. Dr. Cheyne mentions several cases of this kind, in two of which the pretended paralytics evinced ludicrous proofs of their still possessing the use of their limbs immediately after they had succeeded in gaining their discharge. It ought always to be considered a very suspicious circumstance in a soldier or sailor if the loss of power is confined to a single limb, as the arm, as such a form of paralysis coming on in adults is extremely rare. In a case detected by Dr. Cheyne, his opinion of the disease being feigned was chiefly founded on the following considerations: because there co-existed no other signs of disease; because the countenance indicated health and intelligence; because the function of the brain was undisturbed, and all the senses were entire; because paralysis of the arm is a complaint frequently feigned by soldiers, but very rare in reality.

Feigned paralysis has been frequently detected by subjecting the patient to a powerful electric shock. A case occurred in the New-York state prison which resisted all medicines until this remedy was tried. Upon receiving the shock the patient jumped up, ran into the hall, and asked for his discharge from the hospital.* Mr. Hutchinson detected an imposition of this kind in a sailor, by administering a dose of opium to the patient, and then tickling his ear during sleep; to relieve the irritation "the paralysed hand was instantly raised to the ear, which he rubbed with no small degree of force, and then turned round upon his left side, dragging the bed-clothes over him with his heretofore useless arm." Of course the discovery was complete. The editor of the journal in which Mr. Hutchinson's essay first appeared mentions a similar case in a soldier detected by the same means: in this case the sound arm was previously bound down to the side, under pretence of thereby benefiting the disabled limb.†

Shaking palsy is simulated chiefly by mendicants. When the general health appears to be good, little attention need be paid to the shaking. For the diagnosis of this disease see the article PARALYSIS.

35. *Phthisis*.—It could scarcely have been imagined, *a priori*, that a disease like phthisis, attended with such complexity of symptoms, and marked by such conspicuous alteration of the

external parts, would have ever been chosen as a subject of the malingerer. The following extract from Dr. Cheyne, however, will show that this has really been the case; and as this form of simulation has never come under our own view, we shall content ourselves with the remarks of this excellent observer:—"The soldier, not content with representing one feature of consumption, will often undertake a perfect portrait of that disease, and this he will sometimes execute with great cleverness. The thought would seem to strike him while in hospital under treatment for catarrh, or recovering from fever accompanied with pulmonary irritation. His cure all at once seems suspended; his food, he says, *stuffs* him, and he begs to be replaced on spoon or milk diet; he coughs much at the period of the daily visit; he suppresses his cough for some time previously, so that if there is any defluxion, it may be expectorated at that period. He expresses a wish to be let blood or blistered for a pain of the chest; begs for some medicine to relieve his cough; applies for a furlough; in short, so well does he act his part, that unless the surgeon is very circumspect, he will discover, when too late, that he has been made a dupe of."*

It is needless to observe that a thorough acquaintance with all the phenomena of the real disease will enable any one, who is on his guard, to detect an imposition of this kind. Auscultation will be, in such cases, a most powerful, and frequently an infallible means of ascertaining the truth.

36. *Polypus of the nose*.—This has been imitated by the matchless ingenuity of the French conscripts, by introducing the testes of cocks and hares' kidneys into the nostrils.†

37. *Pompholyx*.—This affection of the skin is sometimes simulated by the application of blistering-plaster. The imposture may often be detected by carefully examining the vesicles, as parts of the flies are apt to adhere to them. In a young woman who lately produced this affection in order to retain her comfortable position in an infirmary, this was the case; and, upon examining her box, small fragments of blistering-plaster were found secreted.

38. *Pregnancy*.—An impregnated state of the uterus is sometimes pretended, to gratify the wishes of relations; to deprive a legal successor of his claim; to extort money; to obtain remission of labour; or to delay the execution of punishment. A medical practitioner, who has to give an opinion on a doubtful case of pregnancy, would require to make himself intimately acquainted with the signs of real pregnancy, and he ought especially to consult the best works on legal medicine. Auscultation promises to be the most successful means of discovering whether an alleged case of pregnancy be real or merely pretended. (See AUSCULTATION.)

Pregnancy is very frequently feigned by negro slaves in the West Indies with the view

* Dunlop's *Beck*, p. 12.

† Med. and Phys. Journ. vol. liv. p. 93.

* Loc. cit. p. 160.

† Percy and Laurent, op. cit.

of obtaining ease; as masters are accustomed to indulge them, when pregnant, with repose from the severer kinds of labour. Besides the assumption of the sickness and other common symptoms of pregnancy, they place pads on the abdomen to deceive the sight. When they apprehend a discovery, they pretend that they have had an abortion, and often speedily recommence the same course of deception. They know by experience that it is an easy matter to feign the early symptoms of pregnancy. A case of simulation of this kind, which was carried to a very refined pitch, was mentioned to one of the writers of this article by the gentleman on whose estate it occurred. A female, whose repeated alleged abortions had excited the suspicion of the overseer, and who was in consequence assured that nothing short of ocular demonstration would obtain belief, had the ingenuity to mutilate and prepare a lizard so as to deceive her cunning inquisitor. This imposition, however, was afterwards completely detected. These pretended *gravidae* are occasionally locked up some months before the expected period of delivery; and instances have been known where they have remained confined for many months after this period has passed.

39. *Prolapsus ani*.—This disease has been simulated by partially introducing into the anus a sheep's bladder or gut containing blood, leaving a portion externally to represent the prolapsed rectum. Ambrose Paré mentions a case of this kind; and the authors of the article in the *Dictionnaire des Sciences Médicales* another.

40. *Rheumatism, Lumbago, &c.*—This class of disabilities is frequently feigned by the members of benefit societies, and by soldiers and sailors when they wish to evade a particular duty or to procure their discharge. Rheumatism, when severe, is commonly marked by some functional derangement or organic alteration, which it is difficult to simulate successfully. With respect to soldiers and sailors they ought very rarely to be discharged on account of alleged rheumatism, &c. &c. unless in cases where there is an obvious organic change, such as great extenuation of a limb or nodosity of the joint. As in the case of simple pain, it is often difficult to discriminate these fictitious cases of rheumatism from the real disease. Still an attentive observer will in most cases be able to detect the feigned disease.

The following remarks by Dr. Cheyne on this subject are very judicious, and well deserving the attention of military and naval practitioners: "Chronic rheumatism is distinguished by some disorder of the digestive organs, impaired appetite, a look of delicacy, a degree of pyrexia in the evening, yielding in the latter part of the night or early in the morning to perspiration. Some emaciation, wasting of the muscles of the affected limb, fulness of the veins, and puffy enlargement of the affected joint, take place. There is in general an increase of the temperature of the affected part. These symptoms are much influenced by the state of the weather, and they

in some degree yield at length to proper treatment; whereas those who feign this disease usually retain their appetite and looks; have no diurnal return of fever, and no inflammatory symptoms. They give a glowing account of their sufferings, alleging that they have entirely lost the use of the part affected, which seldom happens in genuine rheumatism. There is for the most part no adequate cause assigned for the complaint; no relief from remedial treatment is acknowledged; and while real rheumatic affections are aggravated by damp, the impostor consents equally at all times."^{*}

41. *Short sight*.—This being a state of vision easily feigned, and, when real, incapacitating the subject of it for the duties of a soldier, is one of the most common disabilities pretended by unwilling recruits. It is also assumed by soldiers in order to obtain their discharge. During the operation of the French conscription, and particularly in the early part of it, before effective means of prevention were taken, short-sightedness was feigned to a singular extent by the young conscripts. In the department of the Seine, of every thousand conscripts who were exempted from service in consequence of disabilities, from the year 1800 to 1810 inclusive, fifty-eight were excused in consequence of being near-sighted. At last the alleged disability became so common that a law was passed forbidding men to be exempted on this ground; and all such persons were ordered to be employed as pioneers, hospital-servants, &c. Besides being assumed where it does not exist, this defect can be produced by the habitual use of concave glasses; and this practice was extensively adopted by the young men in France liable to serve. In short-sighted persons, the *crow-feet* wrinkles at the corner of the eyes are strongly marked, and there is an habitual frowning or knitting of the brows; but these signs are by no means unequivocal. The surest tests are enforcing the employment of concave glasses suited to the exact degree of imperfection assumed by the simulator, and putting him to read a book quite close to the eye. If able to read a book in this position *without* the glasses, and unable to read with the proper glasses at a corresponding distance, we may be almost certain that the disability is feigned. And yet even in this we may be mistaken. MM. Percy and Laurent mention a young schoolmaster, who, in expectation of being some day drawn for the army, practised reading with all kinds of glasses before hand, and when he was drawn he obtained his exemption without difficulty. When any doubt is entertained regarding the existence of this defect, the most advisable measure is to follow the example of the French government, and place the individuals in situations where long vision is less necessary. This disability is rarely feigned by sailors, because, if real, it would not incapacitate them for the duties required of them.

42. *Somnolency*.—Occasionally persons al-

^{*} Op. cit. p. 175.

lege that they are unable to undergo any fatigue, and sometimes that they are incapable of muscular motion on account of a constant and irresistible sleepiness. Dr. Hennen has recorded a most obstinate case of this kind.* Another case is detailed in the *Edin. Ann. Reg.* vol. iv. The subject of this case was a soldier in the Somerset militia, and only eighteen years of age. He had been confined for desertion. From the 26th April to the 8th July, 1811, he lay in a state of apparent insensibility, and resisted every means which it was deemed advisable to attempt for the purpose of rousing him. These means consisted of thrusting snuff up the nostrils, electric shocks, &c. &c. It was at last conjectured that the torpidity might be owing to a fall, whereby his head might have been injured, and the operation of dividing the scalp was performed for the purpose of ascertaining whether there was not a depression of the cranium. The requisite incisions were made, the scalp was drawn up, and the skull examined without a word of complaint. When the instrument destined to scrape the bone was applied, he once, and only once, uttered a groan. As this case seemed to be hopeless, the man was discharged and conveyed to his parents. Two days afterwards, he was seen two miles from home, cutting spars, and carrying reeds up a ladder.

The following case of feigned somnolency, or loss of sense, is a good example of the obstinacy with which the symptoms of disease may be simulated for the purpose of avenging an injury, or to obtain unjust compensation. A clergyman hearing his wife and servant-maid disputing in the kitchen, went below, and interfered so far as to repel some rudeness offered by the girl to her mistress, which he did by pushing her to one side. The girl fell against the dresser, either by accident or design, whereby she received a slight contusion over her eye. She then ran to the street-door, and told the people that she had been almost murdered by her master; and to corroborate this assertion, she fell apparently into an epileptic fit. Shortly afterward she was conveyed, as one expiring, to an hospital, and the clergyman and his wife were dragged to jail. The windows of his house were broken, his furniture was thrown into the street, and an account of the dreadful murder cried over the whole town. The girl lay for ten or twelve days without showing the least sign of sense or recollection. Mr. Dease having been called into consultation, soon detected the imposture, and the woman almost immediately disappeared. The terror and shame of being so publicly exposed made such an impression on the mind of the clergyman that his life was brought into the most imminent danger, and the expenses attending his confinement greatly injured his fortune.†

Somnolency is, however, a real disease, and

may originate without any obvious cause as a symptom of other diseases, or from external injury. Persons whose minds are alienated will frequently remain in bed for several weeks together in a semi-comatose state, resisting every argument and intreaty. This fact, and the following histories of real somnolency, will teach the medical officer to be extremely cautious in pronouncing any such apparent affection to be simulated.

Rudolphi, when in Milan, in 1817, witnessed the case of a journeyman book-binder, nineteen years of age, who was affected with a curious sort of sleepiness, in some degree resembling intoxication. In Rudolphi's presence he fell asleep, although he still continued to fold sheets along with the other workmen. His eyes were shut, and when it was wished to excite his attention, a loud knock was given on the table, by which he was awakened, and then he answered questions. The voice of one of the workmen, who was his friend, excited his attention, even when the tone was low. Upon being partially roused, he looked about with his eyes half open, and seemed to be aware of what was going on around him; for example, when a sheet was purposely folded wrong and given to him, he appeared to be displeased. He wrote a note in Rudolphi's presence. His comrades used sometimes to lead him about when he was asleep, and to make him play at billiards, &c.; but he did not recollect that he had been so employed after he awoke. When allowed to remain asleep for a few hours, he began to snore, nodding his head as many persons do when asleep.

A strong and active hussar, after many an ineffective effort during eight months to rouse him from a state of somnolent listlessness and inattention to his person and duties, was discharged from his regiment, being generally considered as a *skulker*. Being forwarded to Chatham, he came under the care of Dr. Burrell, of the 72d regiment, who, from an absence of every other symptom of disease, was at first led to adopt the same opinion. In the course of a week, however, some difficulty of articulation was discoverable, greater heaviness in his look and sluggishness in motion appeared, which in a few days ended in coma, convulsions, and death. On dissection, two tumours of a firm medullary structure were discovered, in contact with each other, one of the size of a pullet's, the other of a pigeon's egg, situated in the right hemisphere of the brain, and projecting considerably beyond its surface.*

A seaman belonging to one of His Majesty's ships fell from a considerable height, and pitched upon his head: on examination, no fracture or depression could be discovered, the only mark of injury being a tumour of the integuments, which soon disappeared. From the moment of the accident, however, the patient exhibited symptoms of coma, inatten-

* Military Surgery.

† Dease's Remarks on Medical Jurisprudence.

* Dub. Hosp. Rep. vol. iv. p. 138.

tion to surrounding objects, &c.; and he was therefore bled largely, purged, &c. The soporose state continuing without any other marked symptom, and there being discoverable not the slightest inequality of the bone, or other local indication of any injury beneath, the surgeon began to suspect imposition, and had recourse to the most vigorous counter-irritation, by blisters to the head, &c. partly on account of the painful impression produced by these means. This man at length was invalided, and on his way to England was seen by the gentleman to whom we are indebted for this interesting history, in the Naval Hospital at Gibraltar. At this time he lay in a listless semi-comatose state, rousing up when spoken to, opening his eyes and answering questions very rationally. A very marked symptom in this case was the incessant action of the left hand in alternate flexion and expansion, a symptom which had come on immediately after the accident, and had never since left him by day or by night. When the hand was restrained he seemed more uneasy, and as soon as it was disengaged the motions were resumed. He was sent to some of the naval hospitals in England, and his subsequent history is not known until he came under the care of Mr. Cline in May 1800, in St. Thomas's Hospital. At this time, says Sir A. Cooper, he was in a great degree destitute of sensation and of voluntary motion; his pulse was regular, his fingers were in constant flexion and extension. *He had a depression near the superior edge of the left parietal bone.* Mr. Cline trephined him, removing the depressed portion of bone, and the man gradually and completely recovered.*

43. *Syncope.*—A most disagreeable part of the duty of the medical officer is to attend at the corporal punishment of soldiers and sailors. On these occasions it is not rare for the culprit to feign fainting, in the hope of having his punishment remitted; and the medical officer is sometimes called on to decide. In other circumstances, also, syncope is simulated by soldiers and sailors with the view of obtaining particular ends; and it is occasionally the resource of the mendicant to impose on the charitable.

Except in the extremely rare case of persons having a voluntary power over the action of the heart, there can seldom be any difficulty in discriminating the fictitious syncope from the real. The total suppression of the pulse, or its great diminution in point of strength and volume, the coldness of the surface and of the perspiration, the paleness of the countenance, cannot be assumed at will; and without these, the seeming exhaustion or alleged loss of muscular power will not impose on any person of experience. The state of the countenance alone suffices to indicate the real disease in almost every case.

It is hardly necessary again to inculcate on the mind of the young military or naval sur-

geon, that he must, in all cases where the slightest doubt exists, take the side of mercy. It is better that he should be a thousand times imposed upon, than that a fellow-creature should be punished while labouring under a severe disease, to say nothing of the risk of death occurring if the syncope is real.

44. *Swelled leg.* (Barbadoes leg.)—Tumefaction of the leg is sometimes excited by soldiers by putting a concealed ligature round the leg and letting the limb hang over the side of the bed during the night. There was a case not long since in Fort Pitt General Hospital, which was supposed by some of the medical officers nearly to resemble Barbadoes leg. This man had been sent home from India to be discharged. On admission into the hospital his thigh measured in circumference twenty-two inches and three-quarters, the calf of the leg seventeen inches and a half, and the ankle fifteen inches. Six days after the ligature had been discovered and removed, the thigh measured twenty inches, calf of the leg fifteen inches, and the ankle fourteen inches. Close examination will almost always detect the impression of the ligature in such cases, and the practice may be prevented by inclosing the limb in a box, or wrapping it in a marked bandage.

45. *Ulcers.*—The formation or irritation of ulcers by artificial means has been in all ages a fertile source of successful imposition to that class of persons who live by exciting the compassion and charity of the benevolent. In former times the more cunning and less daring vagrants imitated ulcers by fixing certain foreign substances on the skin, such as dry, shrivelled leaves, part of the skin of a frog, and even pieces of flesh. A curious case is quoted by Foderé from an old French surgeon, Pigray, of a young woman who presented herself to the king of France to be *touched* for a large open cancer of the breast, but which, although “*le mieux simulé et contrefaict qui se puisse voir*,” Pigray discovered to be a slice of *spleen* fixed on the mamma!*

The actual formation of ulcers has been much more practised, and in the compulsory military service of all countries has been often carried to a very great extent. This was particularly the case during the late war among the French conscripts, and in the army and navy of this country. The most common site of these artificial ulcers, indeed almost the exclusive site in the army and navy, is the leg, a place, no doubt, selected partly because their existence in that position effectually incapacitates the patient from military duty. These factitious ulcers are either formed entirely by art, or, which is the more common case perhaps, artificially aggravated into great and severe affections from slight sores occurring naturally, or from slight accidents. The means used to effect these objects are very various: vesicants, irritants, caustics, compression, friction, puncture, excision, &c. &c. Some-

* A. Cooper's Lectures, by Tyrrell, vol. i. p. 312.

* Foderé, tom. ii. p. 486.

times a portion of skin is cut out, and then some irritating substance, such as lime, arsenic, corrosive sublimate, tobacco, the skin of salted herrings, acids, &c. applied to establish the ulcer, after which it is kept up by milder kinds of irritation. Mr. Hutchinson says, that the use of mineral acids is most difficult to detect. There was an old woman, who lived contiguous to the recruiting depôt at Dublin, who had the credit of carrying on a great deal of business in this way among the recruits. Her applications appeared to be a mixture of quick-lime and soft-soap. But one of the most approved methods of operating is the firm compression of a copper coin against the tibia; and we have reason to know that this was the most common practice in the navy. Copper has always enjoyed a great reputation as acting injuriously on the animal body, and it is probable that this reputation has been the chief cause of its being employed to produce or aggravate ulcers, although its main effect depends on the mechanical impression produced by it. Mr. Hutchinson once found, in dissecting the leg of a sailor, which he had amputated for extensive caries of the tibia, a half-penny imbedded between the muscles, "nearly three inches from the margin of the ulcer," and which the man confessed to have thrust into the ulcer nine months before.* Friction with sand seems also to have been extensively employed to produce ulcers; a process termed in the flash language "*for-hunting*."† An experienced eye will readily distinguish between an ulcer of recent formation asserted to be old, and one really old; but it is not so easy to discriminate one of long standing, kept up by repeated slight irritation, from a natural ulcer. In some cases, after the establishment of the ulcer, so refined has been the imposition that a blister has been applied *round* it, with the view of producing the red glossy appearance possessed by the cicatrix of ulcerated parts. But the most distinguishing difference is the ready curability of the factitious ulcers, when secured from the tampering of the patient.

When once a soldier or sailor is suspected of keeping an ulcer open, the obvious means of the treatment are, seclusion if practicable, and defending the ulcer from injurious applications. The most common methods adopted by medical officers to effect this last object have been to seal the bandages, or to inscribe on them, after they are applied, coloured lines drawn along the limb in such manner that it would be impossible to re-produce them if the bandage were removed and re-applied. Even these precautions have not always been found sufficient. Some of Mr. Hutchinson's patients kept up mechanical irritation by means of pins thrust through the bandages. He was therefore under the necessity of locking up the whole limb in a wooden box contrived for the purpose, and this he found an effectual remedy.

46. *Vomiting*.—Some persons possess the power of expelling the contents of the stomach at pleasure, and thereby simulate disease of that organ. In 1828, a soldier was for about six months in the General Military Hospital, at Dublin, on account of supposed disease of the stomach, chiefly indicated by a frequent disgorging of his food. About the end of that period it was ascertained that, instead of losing flesh, he increased in weight, a circumstance which was considered conclusive evidence that he did not suffer under any material disease. He was forthwith discharged from the hospital, and we have ascertained that he afterwards performed his duty efficiently. Vomiting became epidemic in the hospital during the time this man was a patient, but it ceased as soon as he was returned to his duty. Percy, in his article on simulated diseases, in the *Dictionnaire des Sciences Médicales*, mentions the case of a drummer who for a long time deceived the medical officer of an hospital by ejecting the contents of his stomach. He could at pleasure regurgitate his food. In a quarter of an hour after he had swallowed soup, he used to return the whole, apparently with great pain and general distress. It was eventually discovered that he privately purchased solid food, particularly hard-boiled eggs, which he did not vomit, and the imposture was thus detected.

Mr. Hutchinson mentions a case of feigned, or rather of factitious vomiting in a sailor, which was produced by voluntary compression of the epigastrium. The vomiting returned periodically, and upon the cause being discovered, was at once prevented by securing the patient's hands. Mr. Hutchinson adds, that he is thoroughly convinced of the existence of this power in certain persons to excite vomiting by pressure on the region of the stomach whenever they please.* Dr. Cheyne says that vomiting is voluntarily produced by some persons by swallowing air and then eructating, in which process part of the contents of the stomach is brought up along with the returned air.† We are, however, cautioned by this distinguished physician not to be too hasty in deciding on the nature of vomiting in suspicious cases, as he himself confesses to have been in one case deceived by a pretended vomiting, and in another to have considered a case of vomiting as feigned which eventually proved fatal.

47. *Wounds*.—These have often been feigned when they had no existence; have been greatly exaggerated when slight; and have been artificially produced by the patient or with his concurrence, in a very aggravated form.

a. *Fictitious wounds*.—The pretence of being wounded when uninjured, or of being severely wounded when only slightly hurt, has ever been the resource and refuge of the coward in the day of battle. This practice has even been carried to such an extent as seriously to affect military operations. Cæsar, in his account of

* Loc. cit. p. 88.

† Dunlop, in Beck, p. 8.

* Loc. cit.

† Dub. Hosp. Rep. p. 165.

the blockade of Utica, speaking of the wounded in a skirmish wherein the enemy were driven with great terror into their entrenchments before the city, says, "qui omnes, discessu Curionis, multique præterea, *per simulationem vulnorum*, ex castris in oppidum propter timorem se recipiunt. Quâ re animadversâ, Varus, et terrore exercitûs cognito, buccinatores in castris et paucis ad speciem tabernaculis relictis, de tertiâ vigiliâ silentio exercitum in oppidum reducit."* In the official report of the capture of Tarragona by the French, in 1811, Count Contreras, the governor, complains of having lost a great many officers in the last defence by their having *feigned wounds* in order to avoid military duty.† "I have many times known," says Northcote, "cowardly lubbers during action come tumbling down the ladder with most violent groans and complaints, though, at the same time, they have received little or no hurt, and all I could do or say could not prevail on them to make a second trial of their courage, nor go up again till the action was all over. Nay, I have been told by those quartered at the same gun, that some dastardly fellows have actually put their feet or stood in the way of the carriage, on purpose to be hurt, that they might have a plausible pretence for going down to the doctor, which I must own I have great reason to believe, having sometimes met with such contusions in the legs and feet, occasioned (according to their own confession) by the carriage, but at the same time so slight as was scarce worth mentioning; though sometimes very violent, at other times there was scarce any injury or contusion to be perceived, notwithstanding the most grievous complaints of pain and uneasiness."‡ Very distinguished men have had the meanness to simulate wounds. In one of his expeditions, Gustavus Adolphus is said to have pretended that he had received a contusion in the leg from a musket-ball, and, as a proof of the fact, exhibited a red spot on his leg and a corresponding blemish on his boot, which refused to receive the usual polish.§

One of the writers of this article was requested to visit an officer for the purpose of examining a gun-shot wound, which he alleged he had received from the enemy in his left arm. Upon examining the site of the wound, no injury could be discovered, except an abrasion of the cuticle, about the size of a large pea. The injury seemed to have been occasioned by a pen-knife rather than by a bullet. Care had been taken to destroy the sleeve of the jacket, so that it was impossible to learn any thing positive regarding the alleged cause of the wound by examining the clothes. Officers have been frequently accused of feigning wounds or contusions after a battle with

the view of having their names recorded in the Gazette, or for the more sordid purpose of claiming a pension.

In a case of feigned wound without loss of continuity, which came under our own notice, the man had stained the part to represent the purplish yellow hue of ecchymosis on the decrease, alleging that the contusion had been received some days previously.

b. Factitious wounds. Mutilation.—The infliction of wounds by the individual, chiefly for the purpose of mutilation, is a practice which has prevailed in all ages and countries where military service has been forcibly imposed upon men. Mutilation was a frequent practice among the conscripts of ancient Rome, more especially during the decline of the empire; and it would appear that it is from the most common species of mutilation among them, viz. by cutting off the thumb (*pollicem truncando*) that our modern word *poltroon* is derived. At first this sort of mutilation exempted the individuals from service; but afterwards the law was altered, and in the prescribed levy from any district, two maimed recruits were only reckoned as *one*. Soldiers who voluntarily disabled themselves were branded and still retained in the service. Mutilation was very frequent among the French conscripts during the wars of the Revolution and the Empire; and the same regulation was eventually adopted in France among the Romans, viz., the retention in the service of all men whose mutilation could be proved to have been intentional. A species of mutilation very common among them was the extraction of the incisor teeth, or the filing them down below the gum, a condition of parts which prevented the soldier from biting off the end of his cartridge in loading his musket.

Mutilation has been very prevalent in the army and navy of this country; and the modes in which it has been effected have often been more than usually bold and severe. The wounds have frequently been inflicted during battle, or in a crowded barrack-room, with the view of giving greater plausibility to their alleged accidental occurrence. Frequently, however, more especially in the navy, the act of self-mutilation has been openly practised.

During the late war a naval officer went on board a merchant vessel at Yarmouth for the purpose of impressing seamen, and while on board said, jestingly, to a boy about ten years of age, that he would take him with some others; upon which the lad ran below, and immediately returned with one of the fingers of his left-hand cut off, exclaiming—"You can't take me now! My father cut off three fingers that he might not be pressed, and I have done the same!" A seaman in the Ambuscade cut off his thumb in the presence of his officers, in a sudden fit of anger and despair at being kept in the service at a time when some others were discharged; and several instances have come to our knowledge where seamen cut off the whole or greater part of their hands, with the

* De Bell. Civ. lib. ii. 35.

† Courier, July 30th, 1811.

‡ Northcote's Marine Practice of Physic.

§ Historical Sketch of the last Years of the Reign of Gustavus IV. of Sweden, p. 57.

avowed purpose of obtaining their discharge. Others, again, who have committed similar mutilation of their persons, have pretended that they were done by accident.

In many cases of mutilation the object of the men is two-fold,—to procure their discharge from the service, and to obtain a pension. The self-inflicted wounds of soldiers are most commonly produced by the musket; and they almost always pretend that they have been accidental. During the period of four years from 1824 to 1828, there were twenty-one soldiers pensioned in Ireland on account of injuries they had received in one of their hands by the explosion of their own muskets. Recent regulations in the army deprive soldiers of pensions who are disabled by such accidents, except they occur in the performance of military duty; and if the mutilation is proved to be intentional, the individuals are still retained in the service, although unfit for the ordinary duties of a soldier. Mutilation occurs in the army more frequently in the hands and fingers than in any other part of the body. In one regiment, however, where the practice became so far epidemic that nine cases of mutilation by the explosion of muskets happened in the course of six weeks, the lower extremities chiefly suffered. We have known a number of cases of mutilation occur among soldiers when they were on a visit to their friends; and little doubt could be entertained that the maiming was voluntary. The injury commonly occurred about one or two days before the expiration of the furlough.

Mutilation has been practised, but much more rarely, by parish paupers, with the view of obtaining immunity from labour. It has also occasionally occurred among slaves in the West Indies; but we have been told that their animal courage is seldom sufficient to prompt such bold measures.

There will rarely, if ever, occur any difficulty on the part of the surgeon in detecting the imposition in the case of wounds being alleged to exist when no wound has been received. In the case of self-inflicted wounds or mutilation, however, it will not always be easy to prove that they have been intentionally produced. The proof will rest sometimes on the nature of the wound, sometimes on the circumstances under which it is stated to have occurred, and sometimes on other collateral circumstances. In the case of a soldier or sailor it will often be a matter of great importance to the individual, that the decision come to is the true one; as it will frequently have the effect of obtaining for him his discharge from the service, and perhaps a pension, or of depriving him of both advantages, and perhaps entailing punishment also. In forming his opinion of the probability of the wound being self-inflicted, the surgeon will be guided by the consideration of the nature and extent of the wound, its situation, the nature of the alleged cause, &c. For instance, if the wound be of such a kind as renders it improbable that the patient either could or would have inflicted

it; if it be of great extent and *more* than sufficient to effect the object the perpetrator may be supposed to have had in view,—if it be in a part of the body to which the patient's hands, or an instrument wielded by him, could not have reached,—the probability certainly is that it is accidental. On the other hand, if these circumstances are reversed, and if the mode in which it is stated to have occurred is improbable or impossible,—if the alleged cause or instrument is ill calculated or not at all calculated to produce the effect,—the surgeon will be more disposed to regard it as voluntarily inflicted. The examination of collateral circumstances will often afford more positive evidence than grounds of a merely medical kind. The following case affords an example of both kinds of evidence. A seaman on board one of His Majesty's ships lopped off two of his fingers with an axe upon a post, in the fore part of the ship termed *the manger*, and in the confusion of the moment left them there. He then ran down into the hold, and uttering a piercing cry rushed on deck, exhibiting his mutilated hand, and asserting that he lost his fingers by the accidental collision of two water-casks. Here the character of the wound sufficed to disprove the truth of the alleged cause;—no collision of casks could produce so clear a wound, or so complete an amputation; still more certain evidence, however, the man's own stupidity afforded; for shortly after his two fingers were found on the manger, and lying near them the axe which had divided them.

The improbability or even impossibility of a wound being inflicted by the patient himself, is, however, no certain proof that it has not been inflicted intentionally; since the unhappy men have been known, like the ancient Romans, to assist each other in the perpetration of this partial suicide. Instances of this kind have been mentioned to us both in the army and navy; the wounds being produced both by fire-arms and cutting instruments. During the late war we remember an instance of a father cutting off one of his son's fingers to prevent him serving in the militia. There was a young convict on board the hulk for boys at Chatham, not long since, who placed his right arm over a space between two beds, and got a companion to strike the fore arm with a long piece of wood. Both the bones were thus fractured; and even after the arm had been put up in splints, he found means to displace the bones, and thereby prevented a perfect union.

In concluding this article, we cannot dismiss from our minds the possible impression it may leave on the minds of junior medical officers in the public service; whom we would guard, on the one hand, if possible, from suffering a spurious humanity to be detrimental to the interests of the army or navy, and, on the other, with even more anxiety, from the vain desire of acquiring temporary consideration by a stubborn and cruel incredulity, or by an affected

shrewdness in detecting imposture where no imposture may exist.

There are cases mentioned in the preceding part of this article, which shew, indubitably, that the simulation of disease has frequently been practised without the existence of any interested motive, indeed without motive of any kind; that there is, in short, a species of monomania of which this simulation is the characteristic. Such cases may occasionally be remembered with advantage.

But there is another consideration equally worthy of being entertained by all who do not wish the common feelings of a man to be lost in those of a mere disciplinarian. For notorious malingers we are in no degree disposed to plead; but when instances of deception become *frequent*, in any country, in any garrison or station, in any regiment, or in any ship of war, the question may very reasonably present itself—is there not something wrong in the arrangement of the place, in the government or administration of the particular portion of the community in which such frequent deceptions are resorted to;—something which, acting injuriously on the bodies or the minds of the men, is therefore not beneath the consideration of the medical officers of the establishment, who alone can appreciate the mischief, and by whose mediation alone it is likely to be remedied? The privilege conferred by their profession, of being *the friends of mankind*, is one which ought not to be willingly resigned.

The negro-slave, and the conscript of an imperial conqueror, may be equally placed beyond the pale of such considerations; but the British soldier or sailor ought never to be so: even the convict is not shut out from mercy. The condition of both soldiers and sailors has, during late years, been much ameliorated; and deceptions are less frequent both in the army and navy than of old. These amendments in their condition have often arisen out of the representations of enlightened and humane medical superintendents. Wherever, therefore, we repeat, the instances of imposture are numerous,—wherever these manifestations of discontent are frequent among men whose general characters afford an assurance that in ordinary circumstances they would not prefer pain and privation to duty; the circumstances in which such opposite and desperate resolutions are taken, should undergo the most scrupulous and fearless investigation. Such a duty is enjoined by an authority higher than any temporary authority to whom its performance may happen to be disagreeable.

(J. Scott.—J. Forbes.—H. Marshall.)

FEVER.—The word *fever*, derived from the Latin term *febris* (a derivative of the verb *ferveo* or *ferbeo*, signifying *to be hot*,) is applied to a class of diseases characterised by morbid heat of skin, frequency of pulse, and disturbance in the various functions.

In the Greek language, the word πυρεξία (from πῦρ, *fire*) expresses fever; hence the

origin of the term *pyrexia*, under which the ancient writers comprehended *fevers* and *inflammations*, a classification which has been retained by modern nosologists. It therefore appears that upon one symptom alone, *increased heat*, the nosological distinction of a very numerous and important class of diseases has been founded. Though this characteristic feature is very generally observed, nevertheless in some cases of fever, strictly so called, the heat of skin is not above the natural standard, sometimes even below it; from this circumstance, therefore, it is evident that other phenomena are necessary to constitute a febrile disease.

We know so little about the cause of the generation of animal heat, that no satisfactory explanation of its increase or diminution in fever has been given: it seems probable, however, from some experiments, that its evolution is intimately dependent on the condition of the brain and nervous system, and until physiological investigations shall unfold with greater certainty the mode in which animal heat is generated, the pathologist must be satisfied with the ultimate fact, that in febrile diseases there is generally, among other phenomena, increased heat.

There are some diseases, the symptoms of which are so characteristic, and so invariably present, that there is little difficulty in determining their precise nature and seat. The various organic inflammations—of the brain, lungs, intestines, &c.—are examples of this class: there are others of which the precise locality is either so varied or obscure, either as regards the symptoms during life, or, in many instances, on dissection after death, that we are unable to discover their nature. To this latter class fever properly belongs. It is true that in most cases of fever we can discover the existence of certain lesions, but these are too vague or indefinite to enable us uniformly to decide on the primary seat of the malady. It is more than probable that in what is usually called *idiopathic fever* there is alteration either of the solids or fluids, although its precise locality cannot in every case be detected; but without disease in either the one system or the other, we maintain that fever cannot exist.

It is too generally imagined that the primary disease which induces fever is essentially local inflammation. The application of this doctrine to the early stage of fever, we hold to be not only at variance with facts, but dangerous as to the practical deductions to which it leads. We know that irritation, far short of inflammation, is sufficient to excite feverish indisposition, more particularly at those periods of life at which the vascular system is easily excited by apparently trivial local or sympathetic disturbance, (for example, in infancy or childhood by dentition or intestinal irritation,) and that this feverishness disappears when the cause is removed. The paroxysm of an intermittent is induced by the peculiar effect of a malarian poison; in this disease, the whole phenomena of fever are well marked, but certainly few

will maintain that the febrile disturbance is the consequence of local inflammation. There can be little doubt that the error alluded to may in a great measure be imputed to the attempts to discover the cause or nature of fever in the various local lesions which are observed in fatal cases.

On the other hand, the important fact should ever be kept in view, that the primary disorder, whatever it may be, passes readily into inflammation, and that the lesions which arise in the progress of fever constitute the principal source of danger, and are in many instances the more immediate cause of death.

If we trace the early records of medicine, we find that the nature of fever has afforded ample field for discussion from the time of Hippocrates to the present day. Both the solids and fluids have been investigated, and arguments adduced in support of the opinion, that a morbid condition of either the one system or the other was the cause of fever.

The ancients possessing a very scanty knowledge of anatomy, either in its healthy or morbid state, and the secretions being evidently vitiated in the progress of fever, it was natural that a morbid condition of the fluids should, in the early ages of medicine, be considered as its primary cause. The humoral pathology was accordingly received as the only explanation or theory of fever, for many centuries. We find the early medical writers entertaining the idea, that the system waged war against something noxious within itself, and that in the attempt to expel the offending agent, a violent commotion was excited. By this plausible theory, the duties of the physician were restricted to assisting nature in her efforts to get rid of what was deemed injurious to the welfare of the body: in fact, fever was imagined to be a natural and salutary process, indispensably necessary to throw off whatever was noxious, whether generated within the body, or introduced by external causes. Some theorists, in their anxious desire to support this doctrine, endeavoured to deduce the term fever from the Latin verb *februare*, signifying to purge or purify, and by those who implicitly believed in this theory, the derivation was no doubt considered apt and appropriate. The application of the doctrines of the humoral pathology in explanation of the phenomena of fever, received much apparent confirmation from the circumstance, that in eruptive fevers, after more or less febrile disturbance, various eruptions appear on the skin. It was rendered still more imposing, when the chemical doctrines of Paracelsus and Van Helmont were first promulgated. These chemical philosophers imagining that in fevers the fluids possessed at one time an alkaline, at another an acid quality, conceived that an effervescence took place, which gave rise to a febrile paroxysm—an assumption which led to not a few fatal practical errors.

The idea that particular forms of fever depend on a morbid state of the fluids has been maintained by many pathologists in more re-

cent times. The vital fluid has been subjected to chemical analysis with the object of ascertaining the comparative difference in its component ingredients during fever: these researches tend to shew, that previous to the attack, the blood is materially altered in its properties, and that its constituent principles undergo progressive changes, as the disease proceeds.

This department of chemical pathology has been lately much elucidated by the experiments of Dr. Clanny, detailed in his published lecture on typhus fever, and also by the observations of Dr. Stevens, who states that on opening the heart in fatal cases of yellow fever, he found, instead of blood, a dissolved fluid nearly as thin as water and black as ink. In both sides of the heart the fluid was equally black, and throughout the vascular system all distinction between venous and arterial blood was completely lost. Dr. Stevens supposes that when the blood is found in this state, it is entirely deprived of its stimulating properties, and therefore unable to excite the heart or to support life. It is affirmed, also, that the changes in the blood take place in a certain determinate order. It first loses its solid parts and becomes thin; it is then deprived of its saline principles, and becomes black and vapid; and lastly, from its preservative elements being destroyed, it loses its vitality so as to be incapable of supporting life.

Dr. Stevens considers this diseased state of the blood as the first link in the chain of the morbid phenomena which constitute fever. He believes that the aerial poisons from which all pestilential diseases arise are attracted with the atmospheric air into the circulation, mix directly with the blood in the pulmonary system, and that this poisoned or diseased state of the whole circulating current is the cause of the subsequent morbid action in the solids. Similar views, with respect to the pathology of fever are gaining ground in France, in which country the doctrines of solidism have almost exclusively prevailed.

The study of the structure and functions of the human body, in its healthy as well as in its morbid state, being the most satisfactory method of investigating the nature of disease, and lesions having been discovered in various organs in those who have died of fever, the attention of pathologists has in later times been directed to the state of the solids, in the hope that the origin of fever might be discovered.

The locality of the disease, however, has been most warmly disputed; indeed there are few organs of the body which have not been fixed on as the seat of fever; from which it may be inferred, that the doctrines of solidism are as little likely as those of the humoral pathology, to explain every variety of this inscrutable disease.

The functions of the brain being almost invariably affected in fever, it was to be expected that the solidists would endeavour to trace its origin to the nervous system. We accordingly find, that towards the close of the

seventeenth century, Stahl maintained that the phenomena were the result of a general commotion in the system, in its endeavour to throw off a spasm induced by torpor of the brain and nervous system. This explanation, which, after some modifications, was adopted by Hoffmann, was the first attempt to assign to the brain an important share in the pathology of this disease. It formed the basis of the theory invented by Cullen, who believed that in fever certain causes produced collapse or diminution of the energy of the brain. The effect of this on the voluntary muscles and extreme vessels was universal debility, and spasm or constriction of the capillaries: the subsequent reaction of the sanguiferous system, however, had the effect of resolving this supposed spasm, and consequently removing the fever. The prominent importance the Edinburgh Professor assigned to the fictitious debility which was imagined to result from this unknown condition of the brain, notwithstanding his theory that there was an inherent protective power in the system by which this fancied weakness was to be overcome, has been followed by serious practical errors, by abstracting the young and inexperienced mind from the more acute forms of fever, and from those important local complications which very frequently take place in its progress. Besides, as Dr. Parr has remarked, in this system the production of spasm by debility is an isolated fact without a support, and the introduction of the *vis medicatrix naturæ* is the interposition of a divinity in an epic, when no probable resource is at hand.

It is evident that in the definition of fever given by Cullen in his nosology, he expressly discountenances the idea of primary local disease; consequently he only partially adopted the doctrine of solidism, his theory merely implying that the various exciting causes act primarily on the brain.

This doctrine prevailed not only in British but in many continental schools, till Dr. Brown, evidently to gratify a feeling of resentment, opposed it with great bitterness. He invented and publicly propounded with much plausibility an opposite theory, which had the merit of great simplicity. According to Brown, the living system is an organized machine endowed with an inherent principle of excitability, arising from a variety of internal and external stimuli, and from which the excitement which constitutes the life of the machine is maintained. Upon these principles he founded the character and mode of treatment of all diseases, which were supposed to consist but of two families, the *sthenic* and the *asthenic*; the former produced by accumulated, the latter by exhausted excitability, and marked by indirect debility. The remedial plan was as simple as the arrangement. Bleeding, low diet, and purging were employed to cure the *sthenic*, and stimulants, of various kinds and degrees, the *asthenic* diseases.

Fevers, therefore, under this hypothesis, like other diseases, are either *sthenic* or *asthenic*, as they are the result of accumulated or of ex-

hausted excitability. This doctrine obtained few adherents in the British schools, though, as we shall presently notice, it prevailed extensively for a time in several parts of the continent, more particularly in the north of Italy.

Another class of solidists asserted that inflammation of the brain was the cause of fever. Ploucquet, who appears to have first taken this view, admitted, however, that from particular circumstances, other organs became occasionally implicated. Though this theory evidently implied that fever was dependent on local inflammation, it gave the disease a wider range—it assumed inflammation of the brain to be the source of fever, but that from the operation of certain causes, other irritations were in some instances superadded. Marcus and Clutterbuck have subsequently adopted this view, and have severally adduced arguments in its favour. Admitting, however, that the various exciting causes of fever do in some instances exert their action on the brain, we have no evidence that they produce, in the first instance, inflammation in this organ: on the contrary, the symptoms denote that the nervous system has only received a peculiar and powerful impression. When, on subsequent reaction taking place, a general impulse is given to the circulation, and the nervous system is roused from its depression, inflammation of the brain does frequently take place, especially in young plethoric subjects, just as it may supervene in any other organ to which, from causes hereditary or acquired, the individual may be predisposed. It should also be impressed on those who are inclined to adopt this doctrine, that although in a considerable proportion of persons who die of continued fever, the membranes, and frequently the substance of the brain, bear unequivocal marks of inflammation, yet such morbid appearances are by no means invariably observed.

We are next to advert to the doctrine which ascribes the phenomena of fever to primary affection of the intestinal canal. Lesions of the intestines in fatal cases of fever had been long ago pointed out by those who devoted much attention to the study of morbid anatomy. Bonetus stated that on dissection of persons who died of malignant fever, he found the stomach and intestines inflamed. Bartholinus made a similar observation; and in the works of Sydenham, allusion is made to ulceration of the intestines in continued fever. Subsequently Ræderer and Wagler* published a description of an epidemic mucous fever which prevailed at Gottingen, in which the appearances which were found after death in the alimentary canal are minutely detailed.

From these statements, it appears that the morbid appearances in the alimentary canal had attracted the attention of pathologists long before the promulgation of the theory in France, that fever was the result of inflammation of the mucous membrane of the intestines. This view, which was first maintained by

* De Morbo Mucoso, Goettingæ, 1762.

Broussais more than twenty-five years ago, has become the prevailing opinion in France, though it has gained comparatively few proselytes in other countries.*

Those who maintain the physiological doctrine of Broussais, contend that fever is entirely symptomatic of irritation or inflammation of the mucous membrane of the intestines. The leading principle of this theory is, that every irritation which is capable of producing an impression on the brain is reflected by this organ on the mucous membrane of the bowels. Broussais applies it to other acute diseases; for instance, in small-pox or measles, the inflammatory excitement by which they are accompanied is supposed to be first conveyed to the brain, and afterwards reflected on the mucous membrane of the intestines, and that thus inflammation (gastro-entérite), the supposed cause of these eruptive fevers, is produced.

It is affirmed that inflammation and its consequences are invariably found in the mucous lining of the intestines on examination of persons who have perished from fever, and that the treatment which is founded on this view is the most successful. Broussais, indeed, asserts with unparalleled boldness, that the tables of mortality declare in favour of the new doctrine, and that its influence on the population would be more favourable than vaccination itself.

Though Röederer and Wagler, Prost,† Baillie,‡ and others had previously detected morbid appearances in the bowels in their dissections of persons who had died of fever, the theory of Broussais, that inflammation of the mucous membrane of the intestines is the cause of fever, had the effect of directing the attention of pathologists still more particularly to the condition of the intestines in this class of diseases. In 1813 M. Petit and M. Serres§ published the account of a disease, very frequent in Paris in 1811, 1812, and 1813, which they called entero-mesenteric fever, and which was characterised by all the symptoms of continued fever, but originated apparently in certain changes in the inferior portion of the small intestines and ileo-cæcal valve, accompanied with enlargement and suppuration of the corresponding glands of the mesentery. The precise anatomical lesion of the intestines, however, was not ascertained by these laborious pathologists, but subsequently by M. Bretonneau of Tours,¶ who, after investigating the subject with great minuteness, came to the conclusion that the

primary source of fever was in the conglomerated mucous follicles, or glands, situated in the lower portion of the ileum and solitary glands of the cæcum.

A most full and elaborate work has been lately published by M. Louis,* in which the pathological views of Petit, Serres, and Bretonneau as to the primary seat of fever are confirmed. This author, moreover, has given a most minute account of the various secondary lesions which supervene on this supposed primary intestinal disease.

These views of the nature of fever now prevail almost exclusively among the French pathologists. Mild fever is supposed to arise from gastro-enteritis alone, the various forms which it occasionally assumes being regarded as gastro-enteritis, with particular complications. For instance, inflammatory or ardent fever (a form rarely observed) imports an intense degree of this lesion; the adynamic (typhus mitior) is regarded as gastro-enteritis which has assumed such a degree of intensity that the general powers decline, while the intellectual functions are more or less disturbed. The more malignant forms of fever (typhus gravior) are supposed to be gastro-enteritis complicated with irritation of the brain, from sympathy with the state of the alimentary canal; and when fetor of the breath, perspiration, and stools are observed, the disease becomes what has been termed putrid fever,—that is, putrid symptoms are superadded to the primary gastric inflammation.

It cannot, however, be conceded that in every form of fever this local disease does exist, as it has not been universally, nor even in the majority of instances, discovered on the most minute examination of the intestines in fatal cases. The more probable inference is, that this gastro-entérite, or follicular disease, occurs only occasionally, and that it is much more common in some places than in others. We know that it is observed more frequently in the fevers of France than in those of Britain; very rarely, if ever, in the epidemic fever of Ireland; and that it is only occasionally met with in the epidemic visitations in the northern districts of England and Scotland.

From its being observed in a greater proportion of cases in London and Manchester, it is probable that there are some local causes or circumstances in particular places which produce this intestinal affection. Whether in those cases in which it has been found after death, (for we maintain that the pathognomonic or diagnostic symptoms by which it has been supposed to be indicated are by no means uniform or satisfactory,) it be the cause or effect of the febrile symptoms by which it is accompanied, is still a question about which there is great difference of opinion, though the majority of British physicians regard these intestinal lesions as only the sequelæ or consequences of fever.

* *Récherches Anatomiques, Pathologiques, et Thérapeutiques sur la Maladie connue sur les noms de Gastro-Entérite*, &c. par P. Ch. A. Louis, M.D.

* *Examen des Doctrines Médicales et des Systèmes de Nésologie*, &c. Par F. J. V. Broussais. Prop. de Méd. cxxkviii. cxxxi.

† *La Médecine éclairée par l'ouverture des Corps*.

‡ *Morbid Anatomy*.

§ *Traité de la Fièvre Entéro-Mésenterique observée, reconnue, et signalée publiquement à l'Hôtel Dieu de Paris dans les années 1811, 1812, et 1813*, par M. A. Petit, l'un des Médecins du dit Hôpital, composé en partie par E. R. A. Serres, &c.

¶ *Trousseau, de la Maladie à laquelle M. Bretonneau a donné le nom de dothin-entérite*. Arch. Gén. de Méd. X. 67, 1826.

The assertion that the treatment founded on the gastro-enteric pathology is the most successful, is only an assumption; indeed, it may be fairly inquired how many hundreds annually survive the treatment calculated to increase gastric inflammation—how many are daily stimulated with bark, wine, and ammonia, and yet recover? Besides, how can this doctrine be applied in explanation of the phenomena of intermittent fever? In France as well as in this country, periodic fevers are successfully treated by stimulants—bark, and even arsenic; not to allude to the complete suspension of the febrile paroxysm for twenty-four, forty-eight, seventy-two hours, or even longer.

These circumstances, when duly weighed, must in our opinion disprove the general conclusion, that every form of fever is the result of gastric inflammation. On the other hand, we are bound to admit the occasional existence (more frequent in some localities than in others) of the various intestinal lesions, which have been so minutely and elaborately described by the French pathologists, to whom, if this discovery be not entirely due, the merit must be conceded of having, with indefatigable labour, followed up the few hints which previous writers had thrown out, and thus brought to perfection one of the most important pathological facts connected with the morbid anatomy of fever.

The celebrated Pinel took a more extended view of the nature of fever than any preceding writer of the continental school. He distinguished symptomatic from primary or essential fevers, and comprehended under this latter class, acute diseases in which there is a quick pulse, hot skin, and disorder in the various functions, the symptoms being independent (as he supposed) of local disease. While he admitted, however, in his classification, the existence of fevers without primary disease in any organ, he evidently localised the varieties when he stated that the seat of inflammatory fever (*angio-tenic*) was in the organs of circulation; that the origin of bilious fevers (*meningo-gastric*) was in the mucous membrane of the intestines; that a particular form of gastric fever (*adeno-meningeal*) depended on disease of the mucous follicles alone; that in another variety (*ataxic*) the brain and nervous system were chiefly affected; another type (*adynamic*) being characterised by great prostration or depression of the vital powers, and often complicated with symptoms which have been usually referred to putridity.

These views have been since partially adopted, and have evidently given origin to the doctrine entertained by a large proportion of physicians of the present day, that fever is an essential disease, that is, the symptoms are independent of primary organic lesion; though it is admitted that in the majority of cases, local inflammations become developed in its progress, and constitute the principal source of the severity or danger of the disease.

The doctrines of Brown, which had obtained, as we have stated, comparatively few

converts in his own country, made a strong impression in the north of Italy. Rasori, who had visited the medical school of Edinburgh, was so enamoured with the Brunonian system, that, on his return to Italy, he published a compendium of this system, (to which the learning and ingenuity of Darwin had given a new impulse,) as well as a translation of the celebrated *Zoonomia* of Darwin.

A few years afterwards, however, a petechial fever appeared at Genoa, in which the stimulating treatment recommended by Brown was evidently so injurious and positively fatal, as to induce Rasori to reconsider the theory. He then became convinced of its inconsistency and error, and ultimately acknowledged this conviction in an account which he published of the epidemic of Genoa.* This epidemic, from whatever causes it arose, had many of the characters of what Brown termed an *asthenic* disease, and was consequently treated by stimulants. From the numbers who perished under this plan, and from observation of its symptoms and progress, during which local inflammations not unfrequently occurred, Rasori was induced to substitute a modified anti-phlogistic, or, according to the language of the Italians, a *contro-stimulant* treatment.

Bloodletting in the commencement of the disease, when the patient was young and vigorous and when the symptoms demanded it, was found decidedly beneficial; and in less severe cases, saline purgatives, antimonials, (more especially the tartar emetic in liberal doses) and acidulated drinks were employed.

These remedies, with blisters in the advanced stage, stimulating friction to the abdomen with the view of allaying the gastric irritation, light bed-clothing, and rigorous diet, constituted the treatment employed in the epidemic.

This change of Rasori's opinions produced a considerable sensation, and had the effect of overturning the leading principles of Brown's system in Italy. The professors in the north of Italy, who were formerly attached to Brown's views, taught the doctrines of Rasori with some unimportant modifications, and ultimately several works emanated from the different universities, explaining the leading principles of the "Doctrine of Contro-stimulus," or as it was afterwards termed, the "New Medical Italian Doctrine." As it would lead to digression, we must refer those who wish to obtain information on the Italian doctrines to the several works alluded to.†

* Storia della Febre Petechiale di Genova. Del Profess. Giovanni Rasori.

† Prima Linia Materie Medicæ, Auctore Syrus Borda.—Della Nuova Medicina Italiana, Proluzione alle lezioni di Clinica Medica nella P. Università di Bologna per l'anno Scholastico, 1816-1817. Del Professore Giacomo Tommasini.—Dell' Infiammazione et della Febre Continua; considerazioni Patologico-Pratiche. D. G. Tommasini, Pisa, 1820.—Del Metodo di curare, &c. Del Profess. Giacomo Tommasini. Bologna, 1821.—Lezioni di Terapea Speciale sulle Infiammazione, e Rendiconto Clinico, di V. Mantovani, Pavia, 1820.—Institutiones Pathologicæ. Auctore, F. A. Fanzago.

Tommasini, whose learning and reputation rank him as a leading authority of the Italian school, considers fever to be the immediate result of a morbid condition of some internal organ; and in this he is followed by a large majority of the Italian physicians.

Others, however, adopt the views of Rubini, and ascribe the phenomena of fever to the effect of a contagious principle absorbed into the circulation, which, after producing inflammatory action, gives rise to symptoms indicating failure of the powers of the system. The antiphlogistic treatment is consequently pursued in the commencement of the fever, and afterwards a stimulant plan, when the powers of the system appear to give way.

The doctrines of Broussais have obtained an inconsiderable number of adherents in Italy, so that we find the views of this celebrated pathologist are much more generally received in France than in any other country.

In our opinion, both essentialists and localists have taken a much too limited view of the etiology of fever. It appears to us that fever, whatever be its form, depends on some modification of one or other of the elements which enter into the composition of the human body, or in other words, that it follows as a consequence of a morbid condition of either the solids or fluids.

We know that, when the function of any organ becomes seriously disturbed, more particularly if inflammation arise, fever is induced. It is probable that the various external causes, terrestrial or atmospheric poisons for example, induce fever by their action on particular parts, in the same way as the different poisons are known to affect particular structures. On this principle the symptoms peculiar to some epidemics may be explained; for instance, catarrhal fever, in which the mucous membrane of the air-passages is affected; or gastric fever, in which a peculiar impression seems to be made on the mucous lining of the intestines.

We shall endeavour to shew, in treating of the pathology of the fluids, that the blood is not only materially changed in fever, but that the diseased state precedes the attack, and that the changes take place in a determinate order. This view is corroborated by Andral, who states "that the fever termed *inflammatory* seems often to arise from no other source than the blood being too rich in fibrine; in like manner, an impoverished state of the blood, whether accidental or natural, is often connected with *mucous* fevers, and with those characterised by a sudden sinking of the vital powers; and that the source and primary seat of *typhous* fevers, properly so called, is proved to be in the blood, inasmuch as they are caused by the introduction of deleterious substances, such as animal or vegetable effluvia, into that fluid."

It is in this way only, by the blood becoming contaminated and in this state circulating through the system, that fever can be supposed to be, according to the language of Dr. Fordyce, "a general disease which affects the whole sys-

tem, the head, the trunk of the body, and the extremities; the circulating, absorbing, and nervous systems; the skin, the muscular fibres, and the membranes; the body and likewise the mind."*

When putrid substances are injected into the blood of the lower animals, this fluid loses its power of coagulating, and acquires a rapid tendency to decomposition: great sensorial disturbance, convulsions, delirium, hurried breathing, and bloody exhalations also take place, followed by speedy death; and if the poison injected be highly concentrated, the animal is almost instantly destroyed.

The effects which follow from the use of food of an unwholesome quality, or from an insufficient quantity of food, are probably owing to the changes which the blood undergoes from these causes; hence scarcity may act both as a predisposing and exciting cause of fever. In this way, the origin of the disease in times of general distress among the poor is readily explained; and the history of epidemic fevers in Britain shews the intimate connexion that has always subsisted between scarcity and fevers of a low or malignant type.

It is also extremely probable, that in fevers which are produced by living in an impure atmosphere, the blood becomes the medium by which the morbid matter is circulated through the system. To prove the effect of putrid emanations on the animal economy, Majendie confined a healthy dog in a situation which exposed him to putrid miasmata. For the first four days there was no change; he then began to emaciate, and died much attenuated within six. Majendie imputed the death of the animal to the effect of the miasmata he respired and took with his food. On opening the body, which was much emaciated, the mucous membrane of the bowels was found inflamed.

CLASSIFICATION OF FEVERS.

Pyrexia, or febrile diseases, have been divided into two great classes,—FEVERS and INFLAMMATIONS. In the present article, we shall consider the first class only, referring the reader for the consideration of the second, viz. symptomatic fevers (inflammations), to the separate articles in the work.

The different forms of fever have received various distinctive appellations, founded on their supposed causes. We accordingly find in systematic works various subdivisions,—*camp, hospital, prison, or jail fever*. Others have preferred, as a ground of distinction, the peculiar phenomena which each type of the disease presents; hence the origin of the nomenclature, *inflammatory, bilious, nervous, malignant or putrid, petechial, typhoid, yellow fever, &c.*

The types of fever which are met with in temperate countries have been arranged according to certain phenomena observed in each. In one form, the symptoms or series of phenomena constituting the febrile paroxysm ob-

* Dissertations on Fever.

serve a continued or uninterrupted course; in a second, they do not follow a continuous course, but become either suspended for a definite period, or a considerable remission or abatement only takes place; in a third, the febrile symptoms are accompanied with a peculiar eruption, which, with certain symptoms, indicates a particular form of eruptive or exanthematous fever.

A classification of fevers, founded on these distinctive characteristics, being sufficient for every practical purpose, the following arrangement will be adhered to in the present work:—

1. Continued.
 - a. A simple.
 - b. Complicated.
 - c. Typhus.
2. Periodic.
 - a. Intermitting.
 - b. Remittent.
3. Eruptive, or
Exanthematous.
 - a. Variola.
 - b. Rubeola.
 - c. Scarlatina.

Before entering on the consideration of the varieties of fever, it will be proper to make a few observations on the phenomena which occur in a febrile paroxysm. The paroxysm consists of three stages,—the *cold*, the *hot*, and the *sweating*, which in general succeed each other in the order enumerated.

These terms have been given from the peculiar symptoms observed in each stage: thus in the *cold* stage, there is sensation of cold accompanied by shaking; the *hot* stage is indicated by increased heat; and the *sweating* stage, by the diaphoresis or perspiration which terminates the fit.

The successive stages which constitute a true paroxysm of fever are only observed in intermittent fever, in which there is a perfect intermission, or *apyrexia* between the fits. In continued, and in symptomatic fevers (inflammations), though there may be sensible abatement of the febrile symptoms at irregular periods, complete suspension of the disease for a definite time, as is observed in periodic fevers, never takes place. Though these diseases are often ushered in by a sensation of chilliness or actual shivering, almost invariably by morbid heat of skin, still the rigor or cold stage is so frequently unobserved, that it cannot be said to be essential either to the continued or symptomatic forms of fever.

The first symptoms of the *cold* stage denote a primary impression on the nervous system. This is evinced by the disinclination to exertion, and the evident feebleness or actual prostration. To these succeeds more or less restless uneasiness, which induces the patient to endeavour to obtain relief by frequent change of posture. This restless state is generally accompanied with more or less mental inquietude; hence the inability to fix the mind on any subject requiring continued attention. These are the sensations precursory to the rigor or shivering-fit, the first

indication of which is a feeling of chilliness: this may be general or only partial; for instance, it may be confined to one or more of the limbs, or to the loins, while the other parts of the body feel comfortably warm. The chilliness, after continuing some time, passes into tremor, which begins first in the lower jaw, and then gradually extending over the body, terminates in general muscular agitation. The tremor is often very severe; in some instances so violent, that according to practitioners who have witnessed the more intense forms of intermittent fever, convulsions have actually supervened; this, however, is to be regarded as a rare occurrence, at least in temperate climates. The skin feels cold, not only to the patient himself, but sensibly so to another person; and when the thermometer is applied, the temperature is found to be many degrees below the average standard of health: according to Dr. Wilson Philip, it has been observed as low as 74° Fahrenheit.

As the cold stage passes off, the skin becomes gradually warmer, though the patient is not always sensible of the change; hence, while he still complains of feeling cold, the skin often feels comfortably warm, or even warmer than natural, to another person.

The appearance of the skin in the cold stage indicates a deficiency of animal heat; the lips, nails, fingers, and toes, in fact those parts at a distance from the centre of the circulation, are pale and shrunk, while the skin becomes rough, resembling that of a fowl after it has been stripped of its feathers: hence the term *cutis anserina* has been applied to express this condition of the skin. The shrinking of the integuments is exemplified by the fact of a ring which fits the finger before the approach of the cold stage, becoming so loose as to fall off soon after it commences. It is also not uncommon for ulcers to dry up, or tumours to diminish in size, and even to subside altogether, while the cold stage of fever lasts: but when the hot stage becomes developed, the finger enlarges, so that the ring again fits tight, ulcers again discharge pus, and tumours reappear.

From the intimate sympathy between the nervous and circulating systems, there is in the cold stage of fever some alteration in the pulse. At the very commencement of the fit, before the rigor has come on, it is more feeble than natural; during the shivering it is small, quick, and occasionally irregular. The breathing is generally at the same time hurried, often suspirious, and the patient complains of tensive pain or constriction in the præcordial region.

When this unnatural state of the muscular, circulating, and respiratory systems has continued for some time, the mental functions not unfrequently become disturbed, indicated by the restlessness so common in almost every kind of fever, by some degree of confusion, and sometimes delirium, or even coma. In some instances the nervous influence of parts at a distance from the brain become impaired, as in the instance of some of the senses

becoming affected, or of the patient complaining of a sensation of numbness in the extremities.

The organs of secretion are at the same time more or less deranged. The patient is indifferent to food, and complains of thirst and of a disagreeable clammy state of the mouth. In some instances there is gastric disorder, manifested by frequent retching or vomiting, or purging of bilious fluid. This gastric irritation is, however, seldom observed in the periodic fevers of temperate countries, though in the bilious remittents of hot climates it forms a prominent character of the disease, and is not unfrequently attended with jaundice. The urine in the cold stage is limpid.

The analysis of the symptoms of the cold stage of fever proves the consecutive disturbance of the nervous, circulating, and secreting systems. It is, however, to be remembered that there is great difference in the intensity of the affection in the several organs; the prominent characteristic—the sense of cold, or even the rigor may be altogether wanting, or only represented by a degree of general indisposition, such as languor, chilliness, and sense of feebleness. This will be more particularly pointed out when irregular periodic fevers are noticed.

The duration of the cold stage of fever varies from half an hour to four or five hours, but there is every intermediate variety as to its length. It is often longer in the first than in the subsequent paroxysms, and shorter in remittents than in intermittents; so that, although its average duration may be computed between one and two hours, much depends on the type of the fever, its severity, and the climate in which it occurs. It is always longer and more severe in warm than in temperate countries; it may even be mitigated by the adoption of certain measures to be pointed out when we come to notice the treatment; but as a general rule, it has been observed that when the cold stage is short, the subsequent stages of the fever are almost invariably severe.

Though there is seldom any danger to be apprehended in the cold stage, it is proper to state, that under some circumstances, so great has been the shock given to the nervous system, that the vital powers have never recovered such a degree of energy as to produce reaction; indeed individuals have actually died in the cold fit.

The approach of the *hot* stage of fever is indicated by the chilliness or shivering subsiding, or alternating with warm flushings. The natural heat and colour of the skin then return, the shrinking and cutaneous constriction being succeeded by fulness, especially of the features, which in the beginning of the hot stage appear more turgid and animated than in health. This is followed by increased heat, which becomes gradually diffused over the body, the thermometer indicating an increase of several degrees above the ordinary average temperature of health, (varying from 100° to 105° Fahrenheit,) while the skin feels dry and parched. With these external changes, there are corresponding

alterations in the functions of the several organs: for example, the depression, stupor, or coma of the cold stage is succeeded by sensibility to external impressions, so that sounds or brilliant light are offensive; there is generally pain in the head, back, and limbs, and not unfrequently transient delirium. The breathing becomes more free; the pulse, from being small, feeble, and rapid, becomes more full and expanded, and the sense of præcordial constriction, which is so oppressive in the cold stage, subsides. In this accelerated state of the circulation, hemorrhage from various parts, more particularly from the nose, lungs, uterus, or bowels, is not uncommon. These evacuations of blood have generally been remarked to be salutary, by relieving local congestions, which are apt to take place in the hot stage of fever.

There is little change in the natural functions: there is perhaps more thirst; the urine becomes high-coloured, but on standing does not deposit any sediment; and should there have been much gastric disturbance during the cold stage, it generally abates or goes off entirely as the hot fit becomes developed.

The hot stage gradually terminates in copious perspiration. This constitutes the *sweating* stage, which is generally followed by great relief. The upper parts of the body first become bedewed with moisture, the sweating afterwards extending over the trunk and lower extremities. The sensorial disturbance now vanishes, the pulse resumes its natural tranquillity, the breathing becomes easy, and the urine in many instances deposits a sediment some time after it has been voided. The sweating, after continuing some time, disappears, but the patient remains weak and exhausted after the paroxysm has quite disappeared.

Though these three stages occur in regular progression in every well-marked paroxysm of periodic fever, there is great diversity in the intensity and duration of each paroxysm as well as of its several stages, as will be fully illustrated when the different forms of periodic fevers are treated of.

FEVER, CONTINUED. The division of fever which, according to the proposed arrangement, comes first under consideration, is the *continued*. This class of fevers has been so termed from the paroxysms consisting of remissions and exacerbations, without intervals of abatement or pyrexia, as in the intermittent and remittent types.

In systems of nosology, every variety of continued fever is comprehended under the term *Synochus* (from the Greek word συνέχω, to continue). The milder forms have been termed *synochus mitior*; the more intense, *synochus gravior*; the intensity depending on the various local inflammations which arise in the progress of the fever.

1. **SIMPLE FEVER.**—There is, perhaps, no disease in which the premonitory symptoms are so diversified as those of fever; this is owing to the general resemblance observed in the commencement of every febrile disturbance, whether idiopathic or sympto-

matic; and it is not until the symptoms have continued for some time, that the practitioner can discriminate the precise nature of the disease.

In idiopathic fever there is generally a period of undefined indisposition, evinced by disinclination to mental exertion: the individual is incapacitated from any ordinary mental effort, his perceptions are less clear and distinct than usual. To this condition of the mental powers the term *languor* is applied, and it is always an indication of the commencement of febrile action. A sensation of *lassitude* or diminution of muscular vigour is next felt; the patient feels fatigued and averse to any kind of exertion; if he attempt to walk, his movements are feebly or unsteadily executed. The muscles soon become unable to support the weight of the body; hence the recumbent posture is not only most easy, but indispensable. Boerhaave first applied the characteristic term *debilitas febrilis* to this state of the muscular system in fever. The alteration in the expression of the countenance, so marked in fever, is probably intimately associated with this condition of the muscular system, and forms a diagnostic of great value to the experienced practitioner, not only of the nature of the disease, but of the various changes which take place in its progress. It is difficult to give in words an idea of the febrile countenance: there is a look of anxiety, denoting much inward distress; the features are pale and sharp; and the whole expression is so changed as at once to alter the character of the countenance: hence the favourable impression which is always taken from any improvement in the aspect of the features.

Irregular chills and sometimes shivering come on; but more generally there are alternate fits of heat and cold of short duration, which continue to recur at intervals, even when the skin is hotter than natural; and it will be observed that during the time the patient complains of chilliness, the skin does not feel cold to another person, nor does the thermometer indicate any diminution of temperature. It appears, therefore, that the coldness is produced by some cause within the system itself, and is by no means to be attributed to external temperature, as it is observed in hot as well as in cold climates, and to recur when every precaution has been adopted with respect to the temperature of the apartment and the clothing of the patient.

About this period there is great restlessness, and uneasiness of an undefined and indescribable nature, which, after a short time, is succeeded by pain in the loins and extremities, with feeling of general soreness.

These symptoms, denoting the first stage of fever, are succeeded by those indicating reaction. The face becomes flushed, and the heat over the surface is steadily and uniformly above the natural temperature, varying from 100° to 105° Fahrenheit. The heat on some parts of the body is perceptibly greater than on others; hence, in those irregular accessions which take place, the increase is chiefly perceptible in the face,

hands, and feet. Sometimes, on the other hand, there is no increase of the animal heat in fever; the skin throughout the course of the disease retaining its natural temperature, or in some cases falling even below it: such deviations are always to be regarded as unfavourable, though, as physiology has not yet discovered the source of animal heat, we are ignorant of the causes on which they depend.

If the circulation be now examined, the pulse, which at the beginning is oppressed, will be found quick, seldom, however, exceeding 100. Besides increased frequency, it may have acquired other characters; it may be quick and soft, or full and strong, seldom, however, hard or tense. It occasionally, though very rarely, happens that the pulse does not, during the progress of fever, vary from its natural condition either as to frequency or power, and even when the other symptoms are well marked. A similar anomaly has just been pointed out as to the heat of skin, which now and then does not exceed, or even falls below the natural temperature.

Though the function of respiration is not necessarily involved in fever, still, when the febrile excitement is considerable, the breathing becomes hurried. This condition must be distinguished from that which depends on some inflammatory condition of the lungs. The absence of cough in the one instance, and its almost invariable presence in the other, with the sounds elicited by auscultation, will tend materially to aid the practitioner in forming a proper judgment of this symptom. It should also be kept in view that in those forms of fever in which the brain is severely affected, the breathing becomes embarrassed. It is sometimes short and quick, or slow and interrupted. In these cases the state of the breathing is the effect of the disturbance in the brain, and not of pulmonary disease.

When the fever has thus become developed, the primary disturbance of the brain is succeeded by symptoms which indicate increased action in the cerebral vessels. This is indicated by headach; the pain being in some instances confined to the forehead, sometimes to the occiput. It varies in intensity as well as duration, but is always increased on any movement of the body, or any circumstance which excites the circulation. In many instances of the mild forms of fever, however, the patient never experiences headach; he complains only of giddiness or of a sense of heaviness or weight, particularly in the occiput. It is not easy to explain the cause of these differences in sensation, but it is important to bear in mind, that they all depend on one and the same condition of the brain, and require similar though perhaps modified treatment.

As the disease proceeds, the languor and lassitude of the first stage give place to sensorial disturbance, indicated by great restlessness and irritability, and sometimes slight delirium towards evening, which abates or totally disappears in the morning.

The various senses are more or less disturbed: the hearing is often morbidly acute, so

that even slight sounds give uneasiness if not pain; sometimes it is dull and obtuse; the sense of smell is vitiated; the taste is so altered that common articles of diet are scarcely recognised, and there is generally great aversion or loathing of food; the mouth is clammy; the tongue covered with thin white fur; and there is more or less thirst.

The excretions are altered, both as to quantity and quality; the urine is high-coloured and turbid, or deposits a sediment on standing; and the evacuations from the bowels are generally of an unhealthy character.

The fever is now said to be fully formed, or, in popular language, to be at "its height." In the majority of cases, towards the evening, or in some instances at irregular intervals, there is an exacerbation, or general increase of the febrile excitement, which abates towards the morning. The accession is indicated by greater restlessness, by the skin becoming more hot, the face more flushed, and by increased thirst and frequency of pulse. It is probably in consequence of the increased velocity of the circulation through all the organs, and consequently in the brain, during these exacerbations, that the patient is so much more restless and indisposed to sleep; and hence it is that, when there is disposition to congestion or inflammation in any organ, it is often developed at these periods.

With regard to the duration of simple fever, the symptoms may continue without any particular change for a few days; but its limitation depends on a variety of circumstances. It may last only one day, and this constitutes the common *ephemeral* fever, which terminates in twenty-four hours; a form to which women in childbed, from a variety of causes, are occasionally subject: or it may go on for an uncertain number of days, or even weeks, terminating, however, in the majority of instances, about the end of the second or beginning of the third week. It not unfrequently happens that its duration is materially diminished by some spontaneous evacuation, either by the skin or bowels, or perhaps by some accidental hemorrhage; or without such spontaneous efforts of the system, by moderate venesection, if the febrile excitement require the loss of blood, or in milder cases, by purging, confinement to bed, and the adoption of a mild farinaceous diet.

The ancients, who accurately observed the phenomena and progress of fever, remarked that the symptoms shewed a tendency to abate at regular periods, which were called critical days. This crisis was observed to occur on the third, seventh, fourteenth, and twenty-first days from the commencement of the symptoms, or first invasion of the disease. If the symptoms passed over the first period, those who gave credence to this doctrine predicted, that the fever would go on to the second or beyond it; for example, if the symptoms did not abate on the seventh, that the fever would not terminate till the fourteenth day; if this day were exceeded, that it would run on to the twenty-first, and so on.

Modern physicians place very little confi-

dence in this restricted duration of fever. The ancients, being afraid of interfering in any way with the efforts of nature to get rid of what they supposed hurtful to the system, considered every kind of treatment improper, and were, therefore, more likely to observe, in the milder forms of fever, an abatement by crisis on particular days. The modern treatment of the disease, founded on more just views of its pathology or nature, is very likely to interrupt or disturb such regular periods of decline; and, therefore, though the doctrine of critical days is not in our day altogether exploded, practitioners are either less inclined to look for them, or to reject the idea as not according with nature. Besides, in fever complicated with local inflammation, such regularity in the crisis cannot be expected to occur; the symptoms, depending in some measure on the condition of the organ, which may, in the progress of the disease, have become inflamed. It cannot, however, be doubted that the notion of critical days was originally founded on correct observation, that fevers are disposed to terminate favourably or unfavourably at certain periods; and though such critical termination cannot in every, or even in the majority of instances, be discerned or traced, the fact, that simple or uncomplicated cases occasionally do so, should always be kept in view.

The convalescence, or period of the decline of fever is observed to be gradual; the feelings of the patient improve, his countenance becomes animated, and its expression so altered, that except by those who are acquainted with the previous aspect of the countenance, the individual would not be recognised—the sleep becomes longer and more refreshing—the pulse comes down gradually till it returns to its natural frequency—the skin becomes cool—the tongue clean—the appetite for food returns—the thirst ceases, and the strength and spirits improve. These favourable changes indicate the stage of convalescence, which is confirmed in a few days under proper management, especially if great attention be paid to the regulation of diet, and avoiding undue bodily or mental fatigue. No consideration should induce the practitioner to relax in his close attendance during this most important, but too often neglected period of the disease.

The description now given applies to the mild epidemic fever of this and other temperate climates. It is almost unnecessary to state, that there is every gradation not only in the intensity, but in the duration of the symptoms. The symptoms may be so mild as scarcely to require more than an aperient, quietude, and abstinence; or they may assume a severe character,—the fever passing into some of the other forms to be afterwards described.

Inflammatory fever.—A variety of continued fever of a hyper-acute form is occasionally observed, and though not very common in temperate climates, it does now and then occur, and requires notice. It has been called inflammatory fever (*synocha*), and may occur at all ages and in all habits, forming the general character of fever in young and plethoric sub-

jects, who have great muscular power and corresponding vigorous circulation. When it occurs in cold and temperate countries, it is distinguished from simple fever (synochus) by its more sudden invasion,—by the more pungent heat of the skin, flushing of the face, suffusion of the eyes and intolerance of light—more intense headach, throbbing of the carotid and temporal arteries, watchfulness, and delirium. The pulse is seldom very rapid at first, but as the disease proceeds, it becomes full, round, and tense, but never remarkably frequent, and the blood after venesection generally exhibits the puffy coat. The breathing is quick, the thirst incessant, and the febrile restlessness distressing. In some instances, there is nausea and vomiting, with pain in the epigastrium, stretching to either hypochondrium; more especially if this form occur in the summer and autumn months in warm climates, where it is generally termed bilious or bilious inflammatory fever. When inflammatory fever becomes fully developed, spontaneous hemorrhage not unfrequently occurs; if it proceed from the nose, it generally affords great relief to the symptoms, on which account it should not be interfered with, unless it produces feelings of exhaustion.

From the violence of the general excitement in inflammatory fever, local inflammations are exceedingly apt to supervene. It may also pass into other forms: we accordingly find that in warm climates, more especially in the West Indies and some districts of the United States, it assumes very often the remittent type, or it may lapse into a low kind of typhoid fever.

Its duration varies according to circumstances. It now and then assumes an ephemeral character,—disappearing in twenty-four hours: mild cases of longer duration by proper management may pass off in a few days; but if the symptoms be neglected in the commencement, the fever may last two or three weeks or longer, and then gradually subside, the symptoms losing their acute character as the disease advances.

It is proper, however, to state that in our experience of the epidemic fever of this country, this form, (synocha,) if it really do occur, has been seldom observed. A few sporadic cases, which have many of the essential characters detailed, certainly present themselves occasionally in the spring months; but these form a comparatively small average proportion of the ordinary fever of Britain. It is, therefore, to the fevers which occur in warm climates that the description given more particularly applies; the character of fever, as will be afterwards explained, being materially influenced by climate and season. It is also necessary to bear in mind the local inflammations which almost invariably arise in the course of these acute fevers, and the effect of such complications on the febrile symptoms.

Gastric fever.—When the symptoms of common fever are attended with more than ordinary gastric derangement, the term *gastric fever* has been applied. Hippocrates, with his characteristic discernment, evidently alludes to this variety of fever, in treating

of acute diseases with heat and biliary dejections; and Galen, the first writer who distinguished fevers into sanguineous and bilious, founded his idea of the latter from the condition of the stools. This form of fever has in later times been called by different names. Baillou first termed it *gastric fever*; Hoffmann, the *choleric*; Baglivi, the *mesenteric*; John Peter Frank, *febris continua gastrica*; Pinel, the *meningo-gastric*.

Disorder in the alimentary canal gives rise, not unfrequently, to fever of a particular form. In other instances, symptoms of gastric disorder may supervene on common fever: in either case, the train of symptoms, which are very much alike, and require a similar mode of treatment, are, in the one case the cause, in the other, an accidental accompaniment of the fever.

Gastric fever may occur sporadically; at other times the gastric symptoms form the prominent type of an epidemic; and from its prevailing in the summer and autumn months after very hot weather, it would seem to be produced by some atmospheric or terrestrial emanations peculiar to this season of the year. There are several accounts on record of epidemic gastric fever: indeed, the fevers of Britain towards the end of summer and in the autumn, are almost uniformly accompanied with gastric irritation, and from our individual experience of the character of fever for the two preceding years (1830 and 1831,) we can affirm, that an unusual degree of gastric disorder has accompanied the disease during the whole of that period. The type of the fever has moreover been low and typhoid to a degree which has not been witnessed for many years preceding, so much so as to preclude the employment of evacuations of any kind, and to render stimuli necessary to an extent very unusual in the London Fever Hospital.

From a communication with which we were lately favoured by our friend Dr. Brown of Sunderland, it appears that a similar type of fever preceded the late visitation of cholera in the north of England. This fact, with the similarity of the symptoms of epidemic fever in those situations in which cholera has hitherto appeared, renders it probable that some peculiar condition of the atmosphere has given a tendency to gastric disorder, not only in fever but in other acute diseases. It is a singular circumstance, also, that when cholera appeared in London, epidemic fever sensibly diminished both in frequency and severity, while the gastric irritation and prostration of strength, which formed the prominent features of fever, have also nearly subsided.

In gastric fever there is great variety in the mode of attack and sufferings of the patient. In some cases there is so little evidence of illness that the patient follows his ordinary pursuits, thinking he is only indisposed from derangement of stomach, till the prostration of strength and the gradual accession of febrile symptoms, shew evidently the nature of the disease. In other cases the sym-

ptoms from the beginning are so well marked, as to leave little doubt of their nature and tendency.

The precursory symptoms are very similar to those of other forms of fever—sense of chilliness, rigors, irregular flushes of heat, languor, lassitude, pain in the head, loins, and extremities. The face is pale and sallow, the conjunctiva yellow; the mouth clammy and bitter, the breath fetid; the tongue at first is slightly coated with thin white or grey fur, which increases in thickness, becoming yellow over the body and root, while the point and edges are red: in other cases, it is clean and morbidly red from the beginning.

More or less disturbance of the stomach is observed early in the disease; there is pain or sense of weight or distension in the epigastrium; often nausea and retching, which generally ends in vomiting of bilious fluid: the state of bowels is variable; there is either constipation alternating with diarrhoea, or there is purging from the commencement, the stools being watery, of a pale green or brownish yellow colour, extremely fetid, and occasionally mixed with blood. The pulse, which from the commencement may not have been much accelerated, now becomes rapid; the breathing hurried; the heat of skin pungent; the febrile uneasiness and general pain increased; and towards evening, there is exacerbation of the symptoms, with watchfulness and delirium. As the morning advances, however, a distinct remission takes place, accompanied with gentle moisture on the forehead and chest. The coating on the tongue becomes more thick, sometimes dry and brown; and the urine, scanty and passed with pain, deposits a lateritious sediment.

At a still more advanced period of the disease, we observe the morning remissions so slight as to be scarcely noticed, while the whole complexion of the symptoms becomes aggravated; the delirium, which was perhaps only noticed towards evening, is constant; the tongue, palate, and throat are more dry, and covered with viscid mucus, or a dry, hard, black crust envelopes the tongue, which is sometimes irregularly fissured and covered with aphthæ; the speech and sense of hearing are impaired; the eyes suffused; the pulse is very rapid and compressible; the evacuations are passed unconsciously, with tympanitic distension of the abdomen. This congreagation of symptoms denotes an intense and advanced form of gastric fever, from which the patient not unusually perishes, though if the previous powers have been vigorous, and the treatment judicious, the patient may be recovered. When a favourable termination is about to take place, the delirium abates, the morning remissions become again distinct and of longer duration, the skin cool and soft, the tongue and palate moist, the former throwing off its dark incrustation and exhibiting the subjacent mucous membrane morbidly red and tender; the bowels become pungent, the stools more consistent, and the abdomen feels soft from the subsidence of the tympanitic distension.

When a fatal termination is about to ensue, the yellowness of the eyes, headach, delirium, and flushing increase; the patient, at one time furious, becomes drowsy and comatose; the stools, and occasionally the urine, bloody and passed involuntarily; the tongue, tremulous, and, as well as the teeth, covered with dry black fur, cannot be protruded. To these symptoms succeed picking of the bed-clothes, starting of the tendons, hiccup, rapid breathing, cadaverous smell of the perspiration and breath, cold sweats, imperceptible pulse, and coldness of the extremities.

It is necessary to state that in gastric, as well as other forms of fever, local inflammations arise in its progress. It is, therefore, important to watch the symptoms in the different organs, more particularly the brain, which from the inflammatory type of the fever at the commencement is often severely affected. In like manner the several organs in the chest and abdomen may become inflamed, and render the disease formidable.

Frank states that in some cases, quantities of worms are expelled from the stomach and bowels during gastric fever. In such instances the febrile symptoms are accompanied with those peculiar to vermination—wandering pains, itching of the nose and anus, prominence of the abdomen, vomiting, tenesmus and copious mucous stools.

The duration of gastric fever is uncertain. When the disease is mild, it may not last above a week or ten days; generally, however, it is tedious and protracted, more especially if neglected in the early stage. It is unnecessary to state that its duration will be materially affected by any inflammatory complication with which it may happen to be associated.

The history of epidemic gastric fever, written for this work by Dr. Cheyne, gives an admirable sketch of this variety of fever; and we beg particularly to call attention to the observations of that able physician on this subject. (See FEVER, EPIDEMIC GASTRIC.)

2. COMPLICATED FEVER.—In the preceding observations it has been our object to shew that in *simple* fever the disturbance in the various organs, however severe, is only functional, no inflammation in any organ having as yet taken place.

It is necessary, however, that the practitioner should bear in mind, that although fever at its commencement may be mild, in a large proportion of cases it assumes a severe character, in consequence of some local inflammation arising in its progress. Hence, whatever be the primary effect of the exciting causes on the various organs, the transition from excitement to inflammation is often rapid, more especially when there is predisposition to disease in any particular organ.

From what has been previously advanced, as well as from the facts which will be adduced when the causes of fever are discussed, there are strong grounds for supposing that the febrile poison produces a peculiar or specific effect on certain organs of the body in the first instance. The affection thus pri-

marily induced, whatever it may be, is not, however, of an inflammatory character, though it is evident, both from symptoms observed during life, and from morbid appearances after death, that inflammation does arise in certain organs in the progress of fever. If the febrile poison be not in a state of great concentration, it may be presumed that a peculiar action only is exerted on one or more organs; if the poison be in a state of greater activity, it would appear to produce severe organic lesion—inflammation, and its consequences.

We do not pretend to explain the *modus operandi*, or theory of action of the causes alluded to; or why, in individuals exposed to the same causes, in one case very slight effects, while in another the most severe and often fatal symptoms are produced. There may be greater aptitude for the reception of the febrile poison in one person than in another, arising from individual peculiarity or idiosyncrasy, as it has been termed.

This tendency of the primary febrile affection to pass into inflammation, which local inflammation is the cause of the severity in the majority of cases of fever, should never be overlooked. It is equally important to bear in mind that the inflammatory action which supervenes, is of a less intense kind than in the ordinary phlegmasiæ.

There are few organs in the body which are not occasionally affected in fever. Some, however, suffer more uniform and severe lesion than others; as for instance, the brain and spinal marrow, the mucous membrane of the lungs, and of the alimentary canal. Inflammation of the parenchyma of organs is occasionally, though less frequently, observed.

Cerebral complication.—From the almost invariable disturbance in the brain and nervous system in fever, it is particularly necessary to watch any tendency to transition from functional disorder to inflammation of the brain. Not only the symptoms during life, but the morbid appearances discovered after death prove that inflammation of the membranes of the brain is by far the most frequent and dangerous of the local inflammations that occur in the progress of fever.

The cerebral affection assumes various degrees of intensity. In some cases it is mild, in others severe; and between these extremes there is every intermediate modification. Sometimes the cerebral affection appears in solitary instances during a mild epidemic, or it may form the prominent character of epidemic fever.

If the symptoms be attended to, it is impossible to overlook the first indications of acute affection of the brain in fever. The general symptoms may at first be little urgent, and proceed as has been stated in the history of mild fever. The patient, however, is afterwards observed to complain of more constant and severe pain in the head, accompanied with throbbing of the carotid and temporal arteries, flushing of the face, and heat of the scalp. In general the pain is confined to a particular part, very often to the forehead and temples,

occasionally shooting to the occiput: at other times it is felt chiefly in the back of the head.

In many instances the cerebral inflammation is not indicated by pain, but by giddiness. Even if the head be shaken, or suddenly moved, no pain is induced, though the giddiness and flushing are increased. Moreover, when pain in the head has existed, it is often of short duration; but, notwithstanding it has ceased, the local affection may be proceeding with equal, if not increased vigour, and, if not arrested, may speedily destroy life. The absence of pain in such cases, therefore, must not be allowed to throw the practitioner off his guard; he must be guided in his opinion of the condition of the brain by the presence of other equally pathognomonic signs. Thus the eyes are brilliant or suffused, their expression either morbidly animated or dull, but generally sensible to light; hence the contracted eyebrows, half-closed eyelids, and the relief experienced from a dark room.

The sense of hearing is also morbidly acute. Sounds which the patient has been accustomed to hear without even exciting attention, become disagreeable, or even painful; every precaution in such cases is therefore taken to lessen the intensity of sounds.

Though the febrile action usually produces a state of watchfulness, this condition is much increased when the brain becomes inflamed; it is often accompanied with a degree of restlessness or moaning; but after the cerebral vessels have been unloaded, the patient generally becomes tranquil, and enjoys intervals of refreshing sleep.

There is also in cerebral inflammation more or less intellectual disorder. In milder cases, the patient is perfectly conscious while awake, but if he drop asleep, it is interrupted by talking; and when he awakes, he is for a time forgetful, utters perhaps a few incoherent sentences, and then becomes perfectly sensible. As the evening approaches, however, the confusion becomes again perceptible, especially on the termination of the occasional short periods of disturbed sleep which attend this stage of the disease. In more severe cases, delirium is observed at intervals during the day when the patient is awake; and if the symptoms in the brain be urgent, it is incessant, loud, and noisy.

The symptoms enumerated indicate a degree of inflammation of the brain, not uncommon in the epidemic fever of this country, which, if treated by the early and vigorous employment of suitable measures, is in general readily subdued, and the recovery proceeds satisfactorily.

The cerebral affection, however, occasionally assumes a more severe form; and those destructive changes which often rapidly take place in the delicate organization of the brain, sufficiently shew the intensity of the previous inflammatory action. The symptoms which indicate this more severe form of brain affection differ from those which attend the sub-acute, chiefly in degree. The pain is more severe and constant; the patient often rolls the head

from side to side; the eyes are more suffused; the sensibility to light and sound is greater; the breathing is rapid and suspirious; the anxiety of countenance is increased; the restlessness and delirium assume a more formidable character: while the noisy vociferation or screaming is incessant, the violence of the patient often requiring restraint. The pulse is more round and tense, but in some cases it is soft, irregular, or intermitting. The skin is hot, and often perspires profusely, in consequence of the incessant bodily agitation or struggling. If active treatment be neglected in the beginning, or should the attack in the brain be of such a severe character as to bid defiance to the treatment employed, the powers of the system give way, the delirium does not subside, but it loses by degrees its acute character; the patient becomes drowsy, and observant only when roused; the eyelids are half closed; sometimes there is squinting or rolling of the eyeball, with dilatation of the pupils; muscular tremor and starting of the tendons come on; deglutition is performed with difficulty; and the drowsiness finally passes into profound coma. The patient then becomes insensible to all external objects; the urine and stools are passed involuntarily; the tongue becomes dry and brown; the teeth and lips covered with sordes; the pulse rapid and feeble, occasionally irregular; and life is speedily destroyed.

It is necessary to bear in mind that between acute and subacute inflammation of the brain in fever, there is every variety of degree or intensity. In many instances the cerebral inflammation assumes a slow insidious character, and is only detected by vigilant examination. Sometimes when there is considerable excitement in the brain, the pulse and other febrile symptoms do not indicate much febrile action; the pulse may not be above the average frequency of health. In some cases the pain ceases entirely, and is succeeded by partial insensibility. The skin may be cool, and the tongue little furred; yet notwithstanding these favourable circumstances, a low form of chronic cerebral inflammation may be going on.

In some instances, again, inflammation of the brain suddenly comes on in the progress of the fever, when there were no previous warnings of its approach. Hence the necessity of watching with incessant vigilance every case of fever during its progress; as no case, however mild or promising, is free from the possibility of sudden attacks of inflammation of the brain.

Pulmonary complication.—The organs of respiration at certain seasons, and in particular epidemics, suffer from inflammation in the course of fever. Laennec states on this subject, that "one of the most interesting results which auscultation has furnished is the constant presence of a catarrhal affection, either latent or manifest during the whole course of continued fever. At the commencement, and most commonly through the whole period of the fever, the catarrh is latent, without cough and expectoration, and only to be discovered by the ste-

thoscope. Sometimes it becomes manifest on the approach of a crisis; and, indeed, the crisis by expectoration noticed by the ancients is neither more nor less than this catarrh. Catarrhal fever is applied to those forms in which the catarrh, just stated to be inseparable from continued fevers, early manifests itself, and gives rise to a copious mucous expectoration. The same appellation has also been given to those violent catarrhs which are accompanied by a symptomatic fever; but in this case the fever, though considerable at first, and often of long continuance, soon loses the character of acute fevers, terminates long before the catarrhal affection, and never presents that combination of cerebral congestions and abdominal disorder, more or less severe, exhibited by true idiopathic fevers, which must be considered as diseases affecting at the same time a great many organs, and perhaps still more particularly the fluids. In eruptive fevers the pulmonary catarrh is equally constant, and most commonly in them it is manifest. In measles it is well known always to be so, and it continues often for a long time after this disorder is cured. The same thing occasionally takes place after simple continued fevers; but in these I have also had frequent occasion to observe, that when a crisis takes place, at the very time when the lateritious sediment shews itself in the urine, every sign (even stethoscopic) of perhaps a very intense and extended catarrh disappears at once with the coma, tympanitic affection, quick pulse, heat, and earthy character of the skin. During the paroxysms of intermittent fever the stethoscope detects in like manner symptoms of catarrh, for the most part dry and latent, and of which some traces remain in the intervals. Even the fevers which are most decidedly symptomatic, for instance those arising from a wound, very commonly present the same phenomena. It would, therefore, seem that the first effect of febrile action is to produce a congestion in the mucous membrane of the bronchi; and this effect is readily conceived on taking into consideration the energy of the actions of concentration and expansion which constitute fever. The inflammatory fever of nosologists, that is, the fever characterised by a flushed countenance, moist and clean tongue, and a moist and moderately hot skin, is, of all fevers, that in which the marks of dry catarrh are the least perceptible. I have even observed two cases of this fever in which the sound of respiration through their whole course was uniformly strong and *pure*, that is, unmingled with any kind of rattle over the whole extent of the lungs. It may here be remarked that this species of fever is, of all, the least liable to change into another form; that it is rarely accompanied by symptoms of any considerable degree of cerebral congestion; that it is hardly ever attended by signs of irritation, or by eruptions or ulcerations of the mucous membrane of the intestines, or by a tympanitic state of the same; and, lastly, that it is almost the only fever in which the blood exhibits the inflammatory crust. In all these respects, then, the inflammatory fever appears

to differ either in its nature or cause from other continued fevers; it is unquestionably the most simple of all, and can least of all be considered as a primary affection of the solids. Pulmonary catarrh is occasionally a striking symptom of pernicious intermittent fever. This appears to have been the case in the epidemic catarrhal fever of 1778; for we find a French Medical Society about that time giving it as a prize question, '*To ascertain the relations of remittent catarrhal and pernicious fevers.*'" (Laennec, p. 101-2.)

Although bronchitis is a very frequent complication of fever, especially in some epidemics, and at particular seasons, it is by no means so universal as the observations of Laennec would lead us to suppose: neither is it to be considered an essential constituent of either continued or remittent fevers; but that it does occasionally supervene in both forms is undoubtedly true. It is perhaps, of all the complications, the most universal in the fever which occurs in the winter and spring months in this country; and no doubt its frequency is in a great measure to be imputed to the sudden variations of temperature peculiar to the climate of Britain.

The symptomatic bronchitis of fever is scarcely to be recognised during the first few days. When it becomes more developed, the symptoms are, besides those which are proper to fever, pain or constriction in the chest, slight acceleration in the breathing, with wheezing sound (mucous rattle) of the respiration on applying the ear or stethoscope to the chest. There is generally at the same time cough, which comes on in fits; it is dry in the early stage, but in the course of a day or two expectoration of viscid mucus, which is expelled with difficulty, and occasionally streaked with blood, takes place. As the bronchitis proceeds, the expectoration becomes more copious and easy, and of a pale yellow or greenish colour. The mucous rattle may be partial or extensive, according as the bronchitis is confined to a small or large portion of the lung. When it is heard over the whole of one lung, the bronchial affection is severe; if it be distinct in both lungs, the case generally terminates fatally. In some cases, however, there is no cough, the existence of the bronchial affection being indicated by slight acceleration in the breathing, with sense of constriction in the chest. The absence of cough renders the local disease very apt to be overlooked; but the state of the respiration, with the aid of stethoscopic examination, will generally sufficiently point out its existence.

In many instances, especially in persons who have had former attacks of pulmonary catarrh, the bronchial affection assumes a more intense form. The breathing is hurried and oppressed, especially after fits of coughing; sometimes it is slow, laborious, and wheezing; the lips are of a dark blue, or livid colour; the cheeks flushed, or of a dusky hue. In still more intense cases, the whole countenance becomes suffused with dark-coloured blood, and from the air-cells being clogged with viscid mucus, the blood

is not duly arterialised; the functions of the brain are, consequently, more or less embarrassed, according to the severity of the bronchial affection. The patient first becomes occasionally incoherent, and afterwards comatose; the pulse soft and feeble; the tongue covered with deep brown, or almost black crust, while the temperature of the skin, more especially of the parts at a distance from the centre of the circulation, falls below the natural standard. It is unnecessary to add that these symptoms indicate great danger; for although recovery under such circumstances may take place, the majority die from the destructive effect of unoxxygenated blood on the brain and nervous system.

It should be kept in mind, that in cases of fever accompanied with severe affection of the brain, the various local complications become so much obscured as to be in many instances entirely overlooked. It has been already remarked that symptomatic bronchitis is often latent in the early stage. When the affection of the brain has been urgent, the bronchial affection never becomes so fully developed as to be recognised by its usual symptoms; it may be going on in an intense form, without any suspicion of its existence. The advantages to be derived from auscultation under such circumstances must be evident; and, therefore, in all the severe forms of fever, the application of the stethoscope should never be omitted.

Though bronchial inflammation is the only form of disease in the chest which can be said to be peculiar to the severe forms of fever, yet true pneumonia and even pleurisy may arise in the progress of the fever, more especially during the stage of convalescence in cold, variable weather, and often under such circumstances prove fatal.

In some instances these inflammations, also, assume a slow insidious character, or become entirely latent; and so obscure do such complications become, that extensive organic changes have been discovered after death, the signs of which have been either very doubtful or entirely wanting during life. Such cases are more common when the previous affection of the brain has been severe; and hence the necessity of frequent stethoscopic examinations in the course of fever, especially if protracted.

It is here necessary to advert to a particular form of fever, which has at various times appeared epidemically in different parts of the globe. From the catarrhal symptoms which gave the peculiar character to the disease, it was termed *catarrhal fever*, *epidemic catarrh*, or *influenza*. The disease appears to have been the consequence of an atmospheric poison acting on the mucous membrane of the air passages; and from the extent to which it prevailed, and other circumstances observed in those who were seized with the disorder, to have had strictly and truly an epidemic origin. It spread over large territories, travelling from north to south, though less frequently, from east to west. The epidemic of 1781-2 is recorded to have first made its appearance in China, and to have traversed Asia

into Europe; from thence it crossed the Atlantic, and extended the following year over the continent of America.

The symptoms usually commenced with alternate fits of chilliness and heat; sometimes shivering preceded the febrile indisposition. The patient soon after felt great languor and feebleness; the debility and depression of spirits being always to a greater degree than could have been anticipated from the mildness of the other symptoms. The most striking feature of the disease next appeared—a distressing pain and sense of constriction in the forehead and temples, often extending over the whole face, and accompanied with a sense of soreness in the cheek-bones. These symptoms were followed by uneasy sensation about the eyes, sneezing and hoarseness, incessant cough, with soreness and constriction about the præcordia, or stitches in the chest, and pain in the back and loins. To these succeeded lachrymation and profuse discharge of thin mucus from the nostrils and lungs, which continued through the course of the disease.

The appetite and sense of taste were much impaired or entirely lost; in many cases there was nausea, and sometimes vomiting; the tongue being coated with thin mucus. The thirst was inconsiderable; the state of the bowels variable; in some they were regular, and in others confined; sometimes there was spontaneous diarrhœa, generally attended with pain, at various periods of the disease.

The pulse, though frequent, was soft and easily compressed; the heat of skin was relieved by irregular sweatings. Daily exacerbations and remissions of the cough and fever were in many instances observed; in others, they did not occur, or if they did, were so slight as to escape observation.

The disease was in some cases very mild; sometimes there was only slight fever, with soreness of the throat and uneasiness in the chest, but no discharge of mucus; but the languor and lassitude were always well marked. In some the disorder began like smart fever, and in a day or two assumed the characters of the common cold, and continued to hang about the patient for a period varying from a week to a month.

Abdominal complication.—Of the organs situated in the cavity of the abdomen, the mucous membrane, but more especially the follicles of the small intestines, undergo certain changes, and although these intestinal lesions are by no means invariable, yet, as we have before stated, in some epidemics, and in the fever of particular localities, they are frequently observed, and form severe and often dangerous complications.

In milder cases of the common fever of this country there is probably little if any intestinal affection; but in the more severe forms the intestinal disease becomes a prominent characteristic of the fever, and generally induces sympathetic disturbance of the brain, or should the cerebral affection have already existed, never fails to increase it. In gastric fever the abdo-

mal symptoms are often so obscure and insidious as scarcely to attract serious attention till the disease has made some progress. Indeed, in fever, destructive disorganization of the bowels may be going on without the practitioner or patient being at all aware of its extent, from the want of diagnostic symptoms to indicate the intestinal lesion on which the danger depends. It is often the cause of slow and protracted fever, and a febrile indisposition which is mild at the beginning often becomes serious from the supervention of this secondary intestinal affection. It may be suspected in such cases, when, in addition to the ordinary febrile symptoms, the skin is dry and parched, the thirst excessive, the lips and prolabium red, the tongue red at the point and margin, the bowels irregular (diarrhœa alternating with constipation), and the abdomen tympanitic, with or without tenderness.

When the brain becomes sympathetically disturbed, the face is flushed, delirium supervenes, followed by more or less stupor or coma, and insensibility to pain and to the evacuations by urine and stool.

Dr. Bright, who has given an excellent account of the symptoms and morbid anatomy of this intestinal affection as it occurs in the course of continued fever,* considers diarrhœa to be the first symptom which indicates its existence. This sometimes exists from the beginning, but more commonly does not come on for nearly a week; the stools are frequent, five, six, or eight in the course of twenty-four hours, and, at first, feculent, dark, and fetid; but afterwards thin and watery, and as if ochre had been mixed with them. The ochre diarrhœa Dr. Bright considers to be characteristic of the commencement of intestinal ulceration, the increasing or decreasing frequency, quantity, and consistence of the evacuations indicating the progress of the intestinal disease. There may or may not be abdominal tenderness or tormina, but when there is pain of the abdomen on pressure, he considers it indicative of inflammation having extended to the peritoneum. Dr. Bright corroborates the opinion already given as to the subsequent sympathetic disturbance of the brain arising from the condition of the intestines, but admits that the cerebral affection may precede and be entirely independent of the intestinal disease, though it progressively increases or diminishes according to the progress of the ulceration of the bowels.

We have already alluded to the opinion entertained by many French pathologists that the follicular disease which was first described by M. Petit is the primary cause of fever. Cruveilhier states that, after he and his fellow-students had watched at the Hôtel Dieu the progress of severe fevers (*les fièvres graves*), and the seat and character of the lesions after death, they became tired of the vague denomination of inflammatory, bilious, mucous, adynamic, and ataxic fevers, finding the same anatomical cha-

* Report of Medical Cases.

racters were always discovered in the intestines; they therefore proposed to substitute the term *intestinal fevers*, for the more vague phraseology which had been introduced. He asserts that this follicular disease occurs under three forms: 1. the acute or inflammatory form; 2. that accompanied with prostration and stupor (*adynamic form*); 3. that attended with cerebral excitement and delirium (*utaxic form*). Inflammatory complications may arise and give a particular character to the disease, but still the original primitive follicular disease exists, and constitutes the most characteristic feature of the malady, which is seated always in the extremity of the small intestines. The ileo-cæcal valve is the principal seat of the lesion; it extends thence as from a centre, gradually diminishing from the last twelve inches to two or three feet in the ileum.

The follicles of the cæcum, appendix cæci, and ascending colon, are also occasionally affected. The mesenteric glands corresponding to the diseased portion of intestine are inflamed and enlarged: hence the name *entero-mesenteric* fever given to this disease, of the symptoms of which Petit has given the following summary:—Feeling of debility and general indisposition; loss of appetite; lassitude; and irregular attacks of fever; the countenance expressive of prostration; the skin, especially about the lips and *alæ nasi*, often harsh and dry; disinclination to exertion; great torpor and intellectual dullness. The febrile symptoms are obscure during the day; but there is an exacerbation towards night, without shivering or much heat of skin; the eyes, before languid, become injected; there is slight delirium; the thirst is urgent; the teeth are dry; the tongue is coated with grey fur; the stools, which vary in frequency and abundance, are bilious, or serous, and insufficient to account for the prostration; the abdomen is soft, and not distended; there is little if any tenderness, but pressure applied to the right side, between the umbilicus and crest of the ileum, often causes pain. As the symptoms increase, the cheeks become livid; the eyes sunk and suffused; with constant somnolence and delirium, though the patient when roused gives intelligent answers. *Petechiæ*, subsultus, and tremors supervene; the pulse becomes rapid and compressible; the teeth covered with sordes, and the tongue with brown or black crust. Abdominal tenderness now succeeds, the pain being in some cases still confined to the ileac region, and without tympanitis; in other cases more diffused, and accompanied with distention. The stools are frequent, serous, and offensive, and the urine is scanty. Excoriations succeeded by sloughing of the nates, and tendency to gangrene on those situations to which blisters have been applied, protract the sufferings of the patient, unless, as generally happens, death puts an end to complicated misery. It is asserted by the French pathologists that it is the most common form of fever in France, and that it may occur sporadically, or constitute the principal feature of epidemic fever.

The successive changes which take place in the mucous follicles during the progress of fever will be explained in the morbid anatomy. It will then be shewn that the destructive processes of ulceration go on progressively, until the coats of the intestines are destroyed in succession, and intestinal perforation at length takes place. The symptoms which denote that this lesion has occurred are, sudden intense pain, with rapid distention of the abdomen, small quick wiry pulse, and peculiar alteration in the countenance. Intestinal perforation is always fatal, generally within thirty-six hours.

Though *peritonitis* cannot strictly be said to form one of the complications of fever, it occasionally supervenes, more particularly at the period of convalescence. Peritoneal inflammation is readily distinguished by the acute pain in the abdomen, increased on pressure; by the knees being drawn up towards the belly; by the sickness or vomiting, and the small wiry incompressible pulse. In some cases, however, there is neither sickness, vomiting, nor frequency of pulse; but only tenderness of the abdomen on pressure. Whether, therefore, this symptom (abdominal tenderness) be accompanied with other distinguishing signs of the disease or not, it should never be overlooked, but treated with decision, as abdominal inflammation may be going on, and even proceeding to a fatal termination, with a quiet pulse and soft skin.

In the preceding account of the complications which occasionally arise in the progress of fever, we have confined the description to cases in which the lesion has arisen either in the brain, in the chest, or in the abdomen.

It happens, however, that in some instances complications take place in more than one organ at the same time. Thus there may be cerebral affection from the commencement of the fever, and in its progress pulmonary or abdominal symptoms may arise; or there may be primary gastric symptoms, with which the brain sooner or later sympathizes. In still more severe cases, inflammatory symptoms in the brain, chest, and abdomen may exist at the same time. It is seldom, however, that in such instances the organs suffer equally, there being generally one on which the inflammatory action has seized with greater intensity.

It is important to remember what has been already stated, that in those more severe cases in which the cerebral affection predominates, should inflammation in some other organ subsequently arise, the symptoms are more or less masked by the cerebral disease. Hence arises the obscurity of the symptoms in those cases of latent pulmonary disease with which fever is frequently complicated, the symptoms being in a great measure concealed by the condition of the nervous system.

In like manner, should peritonitis supervene, the pain may be so slight as not to be felt even on pressing the abdomen; if, however, this condition of the brain subside, the tenderness of the belly becomes developed,

so that the practitioner is very apt, if not aware of the cause of the sudden sensation of pain, to ascribe it to an unexpected attack of intestinal inflammation.*

3. TYPHUS FEVER.—Different explanations have been given of the origin of the application of this term to a peculiar form or type of fever, characterized by the more early and severe affection of the brain and nervous system—by the more constant changes which the mucous membranes undergo—by affection of the cutaneous and glandular systems—and in the advanced stage by great prostration and symptoms denoting putrescence.

According to some it is derived from the Greek word *τύφος*, signifying *stupor*; and by those it is affirmed, that the peculiar expression of stupor in the countenance first suggested its application. By others it is contended that the term is deduced from *τύφος*, to smoulder, or to burn and smoke without vent.

Various other appellations have been given to this class of fevers. It has been designated *malignant fever* from the severity of the symptoms. Willis termed it *nervous fever*; Huxham the *slow nervous fever*. John Peter Frank combined, under the name *nervous*, every fever accompanied with prostration and unusual affection of the nervous system; other writers have termed it *prison, jail, hospital, camp fever*, &c.

The order first established by Pinel, to which he gave the name *adynamic*, (want of power,) is more closely allied to typhus than any other type of fever. It is occasionally observed during the prevalence of epidemic fever, and distinguished by great debility, prostration, feeble but not always accelerated pulse, intellectual disorder, impeded or difficult articulation, and involuntary evacuation of the urine and stools.

A variety of this form he called *ataxic* (irregular): it resembles the *adynamic* as to its origin, but he conceived there was greater disturbance of the nervous system, generally the effect of subacute cerebral inflammation.

We have been able, during the prevalence of epidemic fever, to discriminate both the *adynamic* and *ataxic* varieties, and we were certainly struck with the accuracy of Pinel's description; but though these forms bear a strong analogy to typhus, we think they only form an intermediate class between the more acute and typhoid types.

Though the majority of French writers have retained typhus fever in their arrangement as a distinct class, others, more especially Louis and Cruveilhier, as we formerly stated, ascribe the whole symptoms to primary affection of the mucous follicles of the intestines.

To this, however, we by no means assent, as we have traced the progress of typhous fever, both in the London Fever Hospital and in private practice, to its fatal termination, and on the most minute examination have been unable to discover the follicular disease which these authors state to be so invariably its cause; while on the other hand, we have met with follicular ulceration in individuals the symptoms of whose previous disease had no resemblance to those of typhous fever.

The typhoid form of fever is observed in some individuals during an epidemic of a very different type. When such sporadic cases occur, they probably arise from some peculiarity in the individual, or in the circumstances in which he may be placed. It is not uncommon to find fever, which at first is very mild, assume by degrees the typhoid character. If an individual, seized with fever, reside in an unhealthy district, or be confined in a small crowded apartment, where no attention is paid to ventilation and cleanliness, the probability is that a disease, comparatively mild at first, will be converted into one of severity and danger, from the low character which the symptoms assume.

This is corroborated by the amelioration in the general aspect of the case within a short time after a patient has been removed to a more open district, or into a well ventilated chamber. Physicians attached to fever hospitals are often struck with the marked improvement under such circumstances. The amelioration is not to be imputed to the treatment pursued so much as to the effect of a more pure atmosphere and the frequent ablution and changes of linen, which are so essential in fever.

At other times the type of an entire epidemic is typhoid, and of such epidemics there are many recorded histories; hence the importance of endeavouring to ascertain, after the example of Sydenham, not only the character of fever in different localities, but the nature of the epidemic at different seasons, that the physician may successfully apply those principles of treatment which the type of the fever requires.

There can be no doubt of the existence of every intermediate gradation between the common forms of fever (*synochus*) and typhus, so that it often becomes a matter of nicety to discriminate to which class a particular case or number of cases properly belongs. Sometimes we find, indeed, the one form passing into the other, more frequently mild fever lapsing into typhus.

There is, in general, a perceptible difference in the severity of the symptoms in different cases of typhus. This has led to the distinction, proposed by Cullen, of Typhus Mitior and Typhus Gravior.

* That some estimate of the comparative frequency of the several local lesions which arise in the progress of fever may be formed, the result of 521 cases selected from the journals of the London Fever Hospital is annexed.

Cases in which the fever was not apparently complicated with local inflammation in any organ	163
Cases complicated with cerebral affection	114
thoracic affection	103
abdominal affection	71
cerebral and thoracic affection	26
cerebral and abdominal affection	30
cerebral, thoracic, and abdominal affection	14

In typhus mitior the febrile symptoms are mild, though it is evident from the intellectual disorder and prostration, that the nervous system is much affected. It is probable that in these cases, especially at the commencement, there is no inflammatory action in the brain,—the whole phenomena, viz. great languor, feeling of debility, muscular prostration, soft feeble pulse, giddiness, intellectual dulness, and transient delirium, being the result of the peculiar operation of the febrile causes on the nervous system.

Subacute inflammation of the brain often supervenes on this condition of the nervous system; and when this takes place, the more prominent symptoms of cerebral inflammation are recognized; and to the difference in the intensity of the cerebral affection may be traced the infinite variety of nervous symptoms which individual cases present.

Of the lesions in other organs which arise in the more severe cases of typhous fever (*typhus gravior*), congestion or inflammation of the mucous membranes, bronchial and intestinal, and inflammation of the parenchyma of organs, are the most important. The congested state of the capillaries of the mucous membranes, the blood being at the same time in a state which favours its transudation, occasionally gives rise to hemorrhage from different parts, more frequently, however, from the bowels than from either the nose, lungs, or any other cavity; and when the hemorrhage is excessive, the already exhausted powers of the patient are often irrecoverably sunk. A similar hemorrhagic action is not unfrequently manifested in the skin, in the form of small red spots (*petechiæ*). These vary in colour and size; they are sometimes of a bright red, in other cases of a darker red or even purple hue, and generally distinct; in some instances the spots cohere, and form an ecchymosis of greater or less extent. These patches are termed *vibices*.

In cases of still greater malignity, carbuncles and gangrenous inflammation of the skin, more particularly on those parts which are subjected to pressure, often arise: and the lymphatics, more particularly the submaxillary, cervical, and inguinal, and in some cases the parotid glands, become inflamed, the cellular substance in which they are imbedded not unfrequently suppurating, and thus forming what some writers have considered a critical abscess. At particular seasons also, erysipelas is very apt to supervene, but more particularly in hospitals,—erysipelatous inflammation rarely supervening on fever among the better classes.

From the peculiar changes which take place in the blood in typhous fever, and to which many pathologists of the present day ascribe all the phenomena, the secretions are more vitiated than in the other forms. This is exemplified in the remarkable fetor of the breath and perspiration, which is so peculiar as to be readily recognized, and in the evacuations from the bowels, which are always exceedingly offensive.

After these general observations, we are prepared to enter on the particular symptoms.

Symptoms of typhous fever.—It has been already stated that a distinction of typhous fever has been made, founded on the difference of intensity of the symptoms. The invasion of the milder form (*typhus mitior*) corresponds very much with that of common fever. The patient complains of giddiness, listlessness, and indisposition to exertion, alternate chills, and hot flushes, with uneasiness or pain at the pit of the stomach. These precursory symptoms are succeeded by pain in the back and loins, burning heat of the skin, flushing of the face, sense of weight in the head or giddiness, noise in the ears, and disposition to quietude. The expression of the countenance indicates intellectual dulness. The pulse is frequent and soft; the digestive organs are deranged; food is disliked; cold acid drinks are relished; the tongue is coated with thin white fur, which becomes gradually thicker and of a brown colour, sometimes it is clean but morbidly red; the mouth is clammy from superabundant secretion of mucus in the throat and mouth; sometimes there is pain in the epigastrium, nausea, and vomiting. Towards the third or fourth day, the symptoms in the brain become aggravated, the head feels more heavy, the mind is more confused; the patient, restless and watchful through the day, becomes delirious at night, while, according to some writers, an eruption of miliary or larger vesicles, with intervening redness of the skin, appears on different parts of the body.

The disturbance in the intellectual powers gradually increasing, the delirium, which was only perceptible at night, is observed to recur at intervals during the day; the hearing becomes dull; the patient more torpid; the answers given to questions evincing hesitation and marked indifference to surrounding objects. About this period epistaxis occasionally takes place; *petechiæ* appear in different parts of the skin, more especially on the chest, abdomen, arms, back, and thighs. This petechial eruption is not constantly observed in typhous fever, but seems to form an occasional characteristic of some epidemics; and from this circumstance the disease has been termed *petechial fever*. Dr. Stoker states that, of five hundred and forty patients received into the Cork-street Hospital, three hundred and eighty-six had *petechiæ*. In the London Fever Hospital, the cases now (June 1832) under treatment have almost invariably the petechial eruption.

These spots or exudations of blood are not confined to the skin, but spread over the serous and mucous membranes; hence, in fatal cases of petechial fevers, the surface of the viscera have been found studded with small bloody effusions.

The condition of the alimentary canal in typhous fever is various, not only in different individuals, but in different seasons and epidemics. Sometimes the bowels are torpid throughout the whole period of the dis-

case; in other cases there is diarrhoea from the beginning, which only disappears with the cessation of the fever. The urine is always scanty and high-coloured, and towards the decline usually deposits a sediment.

This is the usual progress of typhous fever for the first nine or ten days, about which period another train of symptoms appear—those denoting collapse or failure of the powers. This stage is announced by the decline of the previous more acute symptoms—by the pulse becoming more rapid and soft—the tongue dry and brown, often tremulous and protruded with difficulty—by the incrustation of the teeth with sordes—by the increasing intellectual disorder, indicated by the more constant low muttering delirium, and the greater insensibility and deafness—and by the condition of the muscular system, evinced by muscular tremor and subsultus tendinum, and in some cases irregularity or intermission of the pulse, by the patient lying sunk on his back, or sliding to the foot of the bed, the muscles being unable to support the body even in the horizontal posture.

From the stage of collapse the patient not unfrequently recovers, the period at which this favourable change takes place being very uncertain; it occurs in some instances about the fourteenth or fifteenth day, but often not till a much later period, depending on the more or less tedious character of the epidemic, and the complications which may have arisen. It is announced by progressive amendment in the symptoms, by the delirium and other symptoms of sensorial disturbance disappearing, the patient enjoying intervals of refreshing sleep; by the countenance improving, and the evacuations being passed consciously, the pulse becoming more slow, the skin cool and soft, and the tongue more clean at the edges and moist over the body. When these favourable appearances are observed, the convalescence, though slow, is gradually established, the individual, however, remaining in a very weak state for a long time.

The progress of the disease to a fatal termination is indicated by coma, more or less profound, hiccup, retention of urine, or involuntary evacuation of the urine and stools, and tympanitic distension of the abdomen.

A modification of typhous fever has been described by Dr. Armstrong under the name of *congestive typhus*, which, in the opinion of this writer, differs from the more common forms of the disease. This theory presumes that the functions or structure of some important organ are deranged by an almost stagnant accumulation of blood in some part of the venous system. There is no re-action; the system does not recover, or only imperfectly, from the first shock or stage of oppression, the energies of the system being either nearly extinguished by the venous congestions, or so much oppressed as to be unable to create excitement. The local accumulations of blood in the veins are supposed to obstruct from the beginning the common series of febrile phe-

nomena; and there is, in consequence, either no morbid heat of skin, or the heat becomes concentrated in some particular parts of the body, while on others it is below the natural temperature. This form, according to this author, is characterized by the sudden invasion, by the overpowering lassitude, muscular feebleness, deep pain, giddiness, or sense of weight in the encephalon; pallor of the countenance; anxious breathing; cool skin; low, struggling, and variable pulse; irritable state of the stomach; mental dulness, apprehension, and confusion, rather than delirium; heavy suffused eye, as if from intoxication or want of sleep; rough, foul, and dry brown tongue; the bowels, torpid in the beginning, becoming in the advanced stage generally loose; the stools copious and involuntary, and accompanied with inflation of the abdomen. The general torpor causes diminution or suspension of the secretions, and such deficiency of cutaneous excitement, that if blisters be applied, they either do not act at all, or so defectively, as to leave an appearance as if the part had been slightly seared by a heated iron. Petechiæ generally appear earlier in this than in any other varieties of typhus, and in the last stage there are sometimes gangrenous spots on the extremities, oozing of blood from the mouth and nostrils, and hemorrhage from the bowels.

Dr. Armstrong has described several modifications of congestive typhus, all of them recognized by the depressed state of the heart and circulation—the uneasiness in the head—the præcordial anxiety—the peculiar condition of the temperature and skin—the total want of excitement, or its partial and unequal development—the suspended or vitiated secretions—and the local load and general oppression.*

When typhus fever becomes complicated with local inflammation, constituting the *typhus gravior* of Cullen and others, the symptoms from the commencement are more severe, and when the cause of this severity is investigated, it will be found to depend on the inflammation which has arisen either in the brain, in the lungs, or intestines.

1. The cerebral complication is known by the more marked and early affection of the brain—the more deep or severe pain, or sense of weight in the head, giddiness, or oppression—suffusion of the eyes—more constant delirium, and disposition to coma—muscular tremor and subsultus tendinum—soft, rapid, and occasionally intermitting pulse—and involuntary evacuations.

2. There is invariably bronchitis in the more severe cases of typhus. It is generally very obscure from the absence of the more prominent symptoms, so that if it be not indicated by cough and accelerated breathing, there is nothing to lead to the suspicion of pulmonary disease. The application of the stethoscope, however, will enable the practitioner

* Practical Illustrations of Typhous Fever, by John Armstrong, M.D.

to discover the bronchitis, sometimes confined to an entire lobe, or in more severe cases extending over both lungs. Not unfrequently, but especially in the winter, and during some epidemics, pneumonia supervenes, and rapidly destroys life.

3. The state of the intestinal canal forms another important feature in the class of fevers under consideration. The symptoms by which the intestinal affection in fever is attended, we have seen to be very obscure; but its existence may be inferred, when the tongue is morbidly red at the point and margins, while the body is dry, fissured, and covered with dry, brown, or black incrustation; when the belly is tympanitic, and there is hemorrhage from the bowels. There may or may not be abdominal tenderness on pressure; more commonly, and particularly when there is much sensorial disturbance, the sensibility is so blunted that the patient does not feel inconvenience even from firm pressure.

Morbid anatomy of Continued Fever.—Though morbid anatomy has not yet unfolded the true nature of fever, more sound views of its pathology and treatment have been obtained, by comparing the symptoms during life with the morbid appearances found on dissection. Before examining the morbid appearances in each organ, it is necessary to premise, that in some instances of sudden and early death from fever, no changes of structure sufficient to account for the fatal issue have been discovered. We are to conclude, therefore, that in these cases the duration of the febrile excitement had been too short to produce any appreciable alteration of structure in any organ.

1. *Morbid appearances in the brain.*—The *dura mater* is scarcely ever altered in appearance, though in some cases a small quantity of serous fluid has been found between this membrane and the arachnoid. Louis observed in one case the inside of the *dura mater* lined with a thin pseudo-membrane.

In the majority of cases, the *arachnoid membrane* exhibits traces of previous inflammatory action; it is sometimes simply vascular, in other cases thickened and opaque, with more or less effusion between it and the *pia mater*. The fluid varies in colour and consistence. It is generally transparent and colourless; but in instances in which the previous inflammatory action has been more intense, it is opaque, of a light straw colour, and of greater consistence, approaching to the nature of coagulable lymph.

In the ventricles there is generally a small quantity of serous fluid, varying from one or two drams to half an ounce; it rarely amounts to an ounce.

The vessels of the *pia mater*, which often adheres in points to the arachnoid membrane, are generally more numerous, distended, and tortuous than in the natural state of this membrane, especially in those cases in which the other parts of the brain exhibit traces of vascular turgescence. According to Louis, the injection of the *pia mater* is greatest

in the rapidly fatal cases, and serous effusion in those of which the progress has been more slow.

The consistence of the *substance of the brain* in fever is variable; sometimes it is extremely soft, so that it lacerates easily; in other cases it is unusually firm. It is difficult to determine how far these opposite states indicate of themselves the previous existence of inflammation. Louis does not seem inclined to believe that either condition is to be considered as the result of inflammation, as the change is uniform throughout the whole brain, and the symptoms during life do not bear an invariable relation to the appearances in the brain after death.

Injection of the substance of the brain is not unusual, the vascular turgescence being observed in a larger proportion of cases in the medullary than in the cortical portion. The blood-vessels are not only more distended, but more numerous, as may be observed on making a section of the brain so as to expose the centrum ovale, when numerous bloody points, the orifices of divided arteries, are interspersed, giving the section a dotted appearance.

The *cerebellum* seldom exhibits any alteration, if we except that of the membranes at the base of the brain, and the effusion with which it is frequently associated. A slight degree of softness of its substance has in some cases been observed.

The *spinal cord* has not undergone that minute investigation which would enable us to speak with certainty as to its general state in fever. When the medulla oblongata is divided, so as to allow the removal of the brain, a quantity of serous fluid escapes from the vertebral canal in those cases in which there has been considerable effusion in the ventricles. The membranes which envelope the spinal cord have been occasionally found vascular, the substance of the medulla spinalis being at the same time injected and softened.

With regard to the proportion of cases of fever in which lesions of the brain have been discovered after death, Louis, in his recent work, states that besides the case in which the inside of the *dura mater* presented a thin pseudo-membrane, in *four* there was a little fluid between the *dura mater* and arachnoid; in *more than half*, the sub-arachnoid cellular tissue was infiltrated with serosity, and in *one half* the *pia mater* was injected with blood. In *three-sevenths*, the cortical substance was redder than natural; in *six-sevenths*, the medullary matter was injected,—these latter appearances being most striking when death took place at an early stage; in *six* cases, the density of the brain was slightly increased; in *five*, it was diminished. Of fifty-four cases examined at the London Fever Hospital, thirty-seven exhibited evident traces of previous inflammation of the brain.

2. *Morbid appearances in the chest.*—The structure of the *larynx* in fever is generally healthy, unless, as occasionally happens during the period of convalescence, laryngitis or tra-

cheitis supervenes. In the former case, the glottis is found contracted in consequence of œdematous swelling or serous infiltration of the submucous cellular tissue of the epiglottis, or rima glottidis: sometimes the larynx is lined with a thin layer of recent lymph, extending into the trachea. In the latter, the peculiar membrane of croup is observed.

Inflammation of the *pharynx*, followed by abscess, occasionally takes place, and when the purulent collection occurs in the vicinity of the glottis, the pressure gives rise to the ordinary symptoms of laryngitis. We have known these cases terminate fatally.

In examining the state of the *lungs*, it is necessary to guard against a source of fallacy. The blood appears chiefly in the posterior portion of the lungs; this circumstance has given rise to the idea that the patient had pulmonary engorgement during life. This pseudo-morbid appearance is readily produced by the gravitation of the blood after death, favoured by the position of the body; indeed, were the body placed immediately after death in any other, we should find a similar congestion in the portion of lung which is most dependent.

When bronchitis has existed during fever, the *mucous membrane* exhibits more or less vascularity; this is most perceptible in the trachea and larger bronchial tubes, though, perhaps, throughout the whole extent of one lobe, the bronchial membrane has a more or less dark red swollen appearance, very different from the pale pink colour observed in its healthy state. When the symptomatic bronchitis has been severe, the bronchial membrane of both lobes appears red, and often considerably swollen and thickened, while the smaller tubes are filled with mucus or muco-purulent fluid.

In fatal cases of fever complicated with pleuritis, adhesions between the *pleura pulmonalis* and *costalis*, with or without effusion of coagulable lymph on the inflamed surfaces, are the usual morbid appearances. Sometimes there is effusion of serous fluid into the pleural cavity, the fluid being frequently mixed with portions of coagulable lymph, which render it more or less turbid.

When the *substance of the lung* has been inflamed, the appearances vary according to the intensity of the pneumonia. When the fever proves fatal in the first stage, the lung is increased in density, and infiltrated with serous or bloody fluid. When it has proceeded to the second stage, it is solid and dense, and no longer crepitates. In a still more advanced stage, the pulmonary structure assumes a granular appearance, and pale yellow colour, from purulent infiltration. In some instances that peculiar lesion known by the term *pulmonary apoplexy* has been observed.

Lesions of the *heart* are very rarely observed in fatal cases of fever. In some instances, but more especially in the fevers of hot climates, which run on to a fatal termination with great rapidity, the muscular structure has been found

softened and attenuated so as to be easily lacerated. Louis states that this affection was uniformly greatest in the instances of rapid death, and was invariably conjoined with a hurried, fluttering, irregular, and feeble pulse. This softening is generally confined to the left side of the heart, though sometimes both sides have been found affected. Other morbid changes have also been observed, but in those instances the organic disease has always been of long standing, the fever having supervened in the progress of the cardiac affection.

The internal membrane of the *aorta* and some of the *larger arteries* occasionally exhibits a bright red colour. This redness, which occurs in patches of various sizes, is not the product of inflammation, but only the effect of *staining*. This has been proved by the fact, that this appearance may be easily produced by filling a portion of a large artery with blood, and confining it by means of ligatures. Some pathologists have mistaken this staining for arteritis.

3. *Morbid appearances in the abdomen.*—The occasional occurrence of abscess in the submucous cellular tissue of the *pharynx* in fever has been already mentioned. The *œsophagus* is generally unaffected. Some writers have alluded to superficial ulcerations in both the *pharynx* and *œsophagus*. Such morbid appearances however are to be regarded only as occasional secondary affections.

The alterations which take place in the *alimentary canal* are chiefly in the mucous membrane, and follicles of the small intestines.

When the cavity of the abdomen is laid open, the stomach and colon are in the majority of instances considerably distended with flatus—the diameter of the small intestines, particularly in those portions where there are lesions, being contracted, and of a dark colour.

On examining the internal mucous coat of the *stomach*, it occasionally exhibits some deviation from the healthy state. Louis affirms that in thirteen of forty-six cases examined, the stomach was quite healthy in colour and consistence. In some instances it is injected in patches of various extent; in others, it is partially and sometimes generally softened and attenuated, so that the mucous membrane is easily detached from the subjacent cellular tissue.

In a few instances, ulceration of the stomach has been found. This occurs in a larger proportion of cases in the fevers of France than in those of Great Britain. Andral states that ulceration of the stomach occurred in one-tenth of the cases examined by him at the Hôpital de La Charité; Louis found this lesion in one-twelfth of those he inspected at the same establishment. In the Fever Hospitals of Britain, this lesion is scarcely ever observed, though we find in many cases appearances indicative of previous inflammatory action in the mucous membrane, viz. redness and softening,

It is seldom that the mucous membrane of the small intestines is sound through its whole extent. The *duodenum* rarely exhibits any trace of disease, and may, therefore, be considered less frequently affected in fever than any portion of the alimentary canal. In the remaining portion of the small intestines (*jejunum* and *ileum*) we find more uniform lesions; in the more rapidly fatal cases, or when the whole force of the disease has centred in another organ, the mucous membrane retains the natural pale pink colour. In general, however, we observe portions of a greater or less extent, uniformly reddened, the tinge differing from a light red vermilion to a deep brown. The redness is usually deeper in the valves than in the intervening spaces, so that if these valves be drawn out, the intensity of the colour very much diminishes or altogether disappears. This red injected appearance of the villous surface of the intestines is generally followed by intestinal hemorrhage. Sometimes, instead of this uniform redness, the membrane is studded with clusters of small red points or dots, which apparently arise from injection of the capillaries, or in some instances from effusion of blood beneath the mucous membrane. The red colour of the membrane, however, is by far the more common appearance, and is more uniform and extensive in the portion of the ileum adjoining the cæcum: it varies in extent in different subjects, often extending for several feet, occasionally over one-half, or even the whole of the small intestines. In the more advanced stage of inflammation of the mucous membrane, the colour assumes a grey tinge, and when this is observed, it always indicates protracted fever. Louis states that he scarcely ever saw the grey colour of the mucous membrane in persons who died before the twentieth day of fever, more generally in those who died from the twentieth to the thirtieth day, or even at a still more advanced period of the disease; hence it has been supposed that the grey colour occurs when the redness of inflammation is passing off, and the mucous membrane is about to resume its healthy colour.

The consistence of the mucous membrane of the intestines is not always uniform. In the majority of instances it retains its natural consistence; in other cases the inflammation produces thickening and pulpiness of the mucous coat. Though softening has been observed in a small proportion of cases only, it is more frequently met with than thickening, and has been more particularly remarked when the fever had been long protracted. It does not, however, appear to be the necessary consequence of inflammation, as it occurs in some cases without redness; that it occurs with both redness and thickening of the membrane, cannot be denied; but, as it is more frequently noticed without either of these conditions, we must conclude that, although we are unable to explain the precise circumstances under which softening of the mucous membrane of the bowels arises in fever, it is not the product of inflammation. We know

that it may be produced very soon by corrosive poisons. Mr. Brodie found the stomach of a dog, to which two grains of the oxy muriate of mercury had been given, remarkably softened half an hour after the poison had reached the stomach.

Besides these morbid states of the mucous membrane, vegetations of a red or brown colour, and of extremely soft consistence, are occasionally met with. They lie one above the other, projecting perhaps three or four lines above the surrounding membrane: they are not very common. We have seen only one case at the London Fever Hospital, and in this subject the vegetations occurred in the lower portion of the ileum. Andral states that he met with them only in the large intestines. Orfila met with a considerable number in the stomach of a person who had taken cantharides.

The tendency of inflammation of the mucous membrane of the intestines to pass into ulceration has been observed by every modern pathologist who has examined the various lesions which arise in the progress of fever.

These ulcerations in some cases succeed to simple inflammation of the villous coat, in which case the ulceration takes place in one or two points, generally in the centre of the inflamed patches; these points become by degrees more numerous and extensive, and at length coalesce so as to form a patch of greater or less extent. The same process may be going on in different portions of the membrane at the same time; and if it happen that the ulceration commences in contiguous portions of the bowel, one or more patches often cohere, and thus form an ulcer of considerable size.

The most common form of intestinal ulceration, however, is that which succeeds to inflammation of the mucous follicles of Peyer and Brunner. These follicles or glands, which in their natural state are very minute, vary in number and size in different situations. At the pyloric extremity of the stomach they are numerous, but distinct or isolated; hence called *glandulæ solitariae*, or after the anatomist who first particularly described them, *glandulæ Brunneri*. They gradually diminish in number towards the extremity of the duodenum, in which situation they are larger and more apparent than in any other portion of the bowels. In the jejunum and ileum they become more numerous and form into groups; hence they are called *glandulæ agminatæ*, or *Peyeri*, (Peyer being the anatomist by whom they were first observed.) They become exceedingly numerous towards the lower third portion of the ileum.

The greater vitality of these follicles, compared with other parts of the mucous membrane, renders them peculiarly liable to inflammation and disorganization; hence we find that, according to the stage of fever, hypertrophy, redness, and ulcerations of these follicles are the only morbid appearances. M. Bretonneau has distinguished this form of intestinal inflamma-

tion by the term *dothineria*, (from *δοθινά*, *pustula*, and *ἰντερον*, *intestinum*.) The glands of Brunner are less frequently diseased than those of Peyer, and if the statement of Louis be correct, viz. that, in other acute diseases, inflammation of the villous coat, as well as enlargement of the mucous crypts or glands of Brunner, are not unfrequently observed, though not so commonly as in fever, but that disorganization of Peyer's glands are never met with, except in some forms of fever, the changes which take place in these follicles (*glandulæ agminatæ*) may be admitted to be peculiar to certain types of fever, and to constitute their true pathology.

With regard to the situation of these ulcerations, it may be stated that they occur in every part of the intestinal canal, from the cardiac extremity of the stomach to the rectum. They occur, however, more frequently in some portions of the bowels than in others. For instance, they are comparatively infrequent in the stomach, still more rare in the duodenum and jejunum: the most common situation is in the lower third portion of the ileum. In the colon they are occasionally found, though less frequently than in the small intestines.

From the following table drawn up by Andral, an idea may be formed of the relative frequency of intestinal ulceration in different parts of the canal.

Seat of Ulceration.	Number of Cases.
Stomach	10
Duodenum ..	1
Jejunum	9
Ileum (lower portion of).....	38
Cæcum	15
Colon { Ascending	4
Transverse	11
Descending ..	3
Rectum	1
Total	92

The ulcerations also vary in several particulars, especially as to number, aggregation, size, and shape. In the stomach there is in general only one solitary ulcer, seldom more than two. In the lower portion of the small intestines they are more numerous, and situated nearer each other than in the upper, in which situation there is often a considerable distance between them: in the ileo-cæcal valve they are generally so closely situated as to form a large patch of ulceration: they are less confluent in the cæcum. As to size, some are not larger than an ordinary pin-head; the more general size is from a split garden-pea to half a crown; but between these sizes there is every intermediate gradation, the structure of the intestine being sometimes completely destroyed for several fingers' breadth above the cæcum, where the largest ulcerations generally occur.

The form or shape of these ulcerations is also various; some are oblong, having their greatest diameter according to the length or breadth of the intestine; sometimes they are circular, occasionally linear. Their number,

size, and depth depend on the duration of the fever. In general, when patients die within the first fourteen days, the disease in the mucous membrane, or in the follicles, has not advanced to the stage of ulceration, though from every appearance this subsequent stage would soon have taken place.

When the ulcerations are numerous, large, and deep, we may presume that the fever is of considerable duration,—that it has advanced beyond the third week. In the same portion of intestine, too, every successive change may often be observed: thus we find in one part the mucous membrane red and swollen; in another, the mucous follicles enlarged; in a third, abrasion of the membrane or follicular ulceration.

Sometimes these ulcers extend chiefly in breadth, but more frequently in depth, destroying in succession the coats of the bowel. When the diseased process has commenced in the follicles, a small spot of ulceration is observed on their summit; the ulcers then gradually extend both in breadth and depth, so as to expose the muscular coat, which then becomes the floor of the ulcer: in process of time the muscular coat is destroyed, the peritoneal covering alone remaining; and should the patient survive, this becomes gradually thinner by ulcerative absorption, and at length gives way, constituting *intestinal perforation*: the escape of the contents of the bowels through the aperture being followed by rapid peritonitis and death.

The symptoms which indicate intestinal perforation are sudden excruciating pain and increased distention of the belly; sometimes vomiting; small, rapid, feeble pulse; shrinking of the features; cold sweats; and death follows generally within thirty-six hours, though some individuals have existed for a longer period.

When the brain has been much affected, the patient is so insensible as not to feel pain in the abdomen, even when the perforation takes place: in such instances it may be suspected from sudden alteration in the features, rapid distention of the abdomen, and small contracted quick pulse. In some instances, the adhesion of the portion of the intestine, at the point where the ulcerative process is going on, to some adjoining viscus, has prevented the peritoneum giving way, and the consequent effusion of the intestinal contents into the abdominal cavity.

It appears, as we have already observed, that intestinal ulceration is more common in the fevers of France than in those of Britain, and that they occur more frequently at some seasons than at others. It is probable, too, that they are found in a larger proportion in populous places, as in the large towns, than in villages or the open country. Of fifty-four cases examined at the London Fever Hospital, (1828-1829,) intestinal ulcerations were discovered in sixteen; and in ninety-two cases of two hundred and twenty-nine treated at La Charité by Lerminier. On what this difference depends, it is not easy to determine.

With regard to the cicatrization of intestinal ulcers, there is now no longer any doubt that this reparative process does take place. Besides the well authenticated example in the case of the late celebrated Beclard, in whose stomach a cicatrized ulcer was discovered at the small curvature, we have the testimony of Troillet, Louis, and other pathologists, on this point; and though we ourselves have never witnessed an unequivocal instance of genuine cicatrix, the minute detail, by those writers, of the various stages observed during this process, and their accurate description of the appearance of intestinal cicatrix, leave no longer any doubt on this subject; but from the want of diagnostic symptoms to indicate the existence of intestinal ulceration, it cannot be determined in what proportion of cases this reparative process takes place. It is probable, however, that it is a rare termination of such lesions.

The *colon*, in fatal cases of fever, is considerably distended with flatus; it appears to be the portion of intestine in which tympanitic distension usually occurs.

The internal or mucous surface sometimes exhibits evidence of previous inflammation in the red, softened, or thickened state of this membrane. The mucous follicles are occasionally enlarged; and ulcerations, chiefly in the *cæcum*, are now and then observed.

The *mesenteric glands* are almost invariably diseased: when there is no intestinal ulceration, they are simply enlarged and indurated; when ulceration of the bowels has taken place, these glands, besides being enlarged, generally contain pus.

The *external absorbents*, especially those situated in the neck, axilla, and groin, are occasionally enlarged and indurated. In some epidemics parotid buboes are not uncommon, indicating a malignant form of fever.

The only alteration in the *liver*, which may, perhaps, be deemed peculiar to fever, is softening; and this is only occasionally observed. In those instances, it is of a pale colour, and so soft as to be very easily lacerated.

The *spleen* is very generally altered in structure in fever. This alteration consists in unusual softness, in some instances to such a degree that the organ is reduced almost to a pulp, and breaks down on the slightest pressure: it is generally accompanied with enlargement, though seldom to any considerable extent, while its colour is changed to a very dark purple or a reddish black.

This softened state of the spleen has been observed in every stage of fatal cases of fever; in those who perish early, as well as in those in whom the disease is more protracted; it does not appear to have an inflammatory origin, since its capsule is generally sound. From this extreme softness in some forms of fever, more especially typhoid fever, and in diseases of putrescency, such as scurvy, it is probable that a morbid condition of the fluids has a peculiar effect on the structure of

this organ, though we know of no symptoms which indicate this particular lesion.

In one case which came under the care of the writer of this article, at the London Fever Hospital, a small circumscribed abscess was found in that portion of the spleen which is connected with the diaphragm. In this instance symptoms of pleurisy of the left side arose in the progress of fever, which did not yield to the ordinary treatment. The patient eventually died; and on dissection, a small tumour of the size of an egg was observed in the centre of the diaphragm, which gave at first the idea of diaphragmatic hernia. On more close inspection it was discovered to be an abscess in the spleen, which had formed an attachment to the diaphragm, through which it had so far penetrated as to be covered only by the thin transparent pleura. It appeared just about to burst into the left side of the chest. The general structure and size of the organ were otherwise healthy.

Pathology of the fluids in fever.—That the fluids are changed in fever is evident from the altered state of the various secretions, as well as from certain appearances which have been observed in the blood itself. This subject, though of the utmost importance, has been hitherto almost entirely neglected, probably in consequence of the pathologists of the present day being more disposed to investigate the morbid changes which take place in the solids, and consequently to trace the causes of the phenomena of fever to disease in them, rather than to any alteration in the blood itself.

The doctrines of humoral pathology which prevailed for many centuries were not founded on direct experiments, but on vague conjecture, from observation of the constant and uniform vitiation in the fluids. Chemical analysis in those days had not attained the perfection necessary to detect the various changes which the blood and fluids were supposed to undergo; and, in later times, the acknowledged difficulty of such experimental inquiries, with the zeal with which morbid anatomy is cultivated, will account for the slow progress of this department of pathology.

That the blood does undergo changes in fever was always conjectured: that certain changes precede its development, and that certain alterations in its component principles do arise in its progress, is not only highly probable, but, as has been already stated, some modern pathologists do not hesitate to affirm that a vitiated state of the blood is the origin, source, or proximate cause of the disease.

It has been often observed by practical physicians, that the blood drawn from persons labouring under fever differs according to the type and the duration of the disease. In cases which bear the inflammatory character, the coagulum is firm, the fibrine abundant, or in greater relative proportion to the water and albumen: in some instances the coagulum is so dense that little or no serum is separated.

This condition of the blood may or may not be accompanied with the buffy coat.

There appears, however, in the progress of fever, to be a gradual diminution of the fibrinous principle; the coagulum being not only small in proportion to the serum, but of a loose soft texture. Upon what this diminution of the fibrine, and of the force of aggregation by which its particles are kept together, depends, neither physiology nor chemistry has yet discovered; all that in the present state of medical science we do know on this point, are the facts stated. Dr. Clanny has endeavoured by well-contrived experiments to determine with accuracy the relative loss or diminution of fibrine at the various periods of fever, and certainly his investigations on this curious subject deserve attention.*

The changes which take place in the secretions in the progress of fever, and which are so evident to the senses, depend in some measure on the general disturbance which takes place in every organ of the body, as well as on the condition of the blood. It is evident that if this fluid, from which all the secretions originate, be in a morbid state, the fluids which are eliminated from the parent source, must likewise be in an unhealthy state. The changes which the individual secretions undergo in fever have not been ascertained by chemical experiment, the knowledge we have of their vitiation being derived exclusively from observation.

Crisis of Fever.—From the earliest periods of medicine, the termination of acute diseases, more especially fevers, was observed to be preceded or accompanied by certain appearances or symptoms which indicated a favorable or unfavorable termination of the malady. Hence the origin of the term *crisis* (from *κρίσις*, judgment), and the days on which these changes occurred were called *critical days*.

The crisis was regarded as salutary when an evident amendment or complete cure accompanied or followed the change; *perfect* when there was an entire cure of the disease; *imperfect* in the case of simple amelioration; and false when certain appearances, such as hemorrhage, petechiæ, colliquative sweats, inflammation of the parotids, and carbuncles appeared, as these only portended a more dangerous and probably fatal form of fever.

Those who embrace the humoral pathology of fever imagine that the termination of the symptoms is produced by some great effort of the system to relieve itself, following the Hippocratic doctrine, that there being always a morbid matter to be expelled, nature was ever endeavouring either to attenuate this supposed morbid material, or to discharge it from the system. The solidists on the other hand contend that the solution of fever is effected by the treatment applied to the local affection, of which the fever is supposed to be symptomatic. Without entering into this discussion, we may observe that the crisis of

fever often takes place without sensible evacuation: in a large proportion of cases, however, it is preceded or accompanied by some change in the secretions, or by diarrhœa or hemorrhage.

The urine is well known to exhibit certain alterations in the progress of fever. In the early stages it is diminished in quantity, but without any change in its colour or chemical properties. As the symptoms advance, the urine becomes darker in colour, but does not deposit a sediment till the fever begins to decline, when it is increased in quantity, and deposits a cloud or sediment on cooling. This urinary deposit, which is sometimes copious, appears in the bottom of the vessel some hours after the urine has been voided: from its resemblance to brickdust it has been called *lateritious*, and by evaporation may be collected in minute crystals of lithate of ammonia. This sediment is by no means peculiar to patients labouring under fever, but is often observed in the urine of healthy persons, or in those whose function of digestion is impaired. In other instances the sediment is of a pinkish white colour, and to this deposit, which according to Dr. Wilson Philip consists of the phosphates of the urine, the term *furfuraceous*, or *branny*, has been given. He regards both these urinary deposits as indications of returning health, and particularly of the renewal of a free secretion by the skin, which in fevers is generally a favourable symptom. In some fevers terminating favourably, there is an unusual tendency to sweat which only exhausts the strength. In these the furfuraceous sediment is observed, but without removing the fever. This is the case in hectic fever.*

The connexion of the favourable termination of fever, more especially intermittents, with free perspiration, was so often remarked by the ancients, that it gave rise to the practice of treating the disease by means calculated to induce diaphoresis, a practice which was followed by the most injurious consequences. They believed the abatement of the symptoms to be entirely owing to the free action of the vessels of the skin; and that consequently, if

* Dr. Wilson Philip states that the following are the only appearances of the urine, if we except those it assumes in consequence of morbid affections of the urinary organs, which can be distinctly marked:—the pale urine without cloud or sediment—the pale urine with a slight cloud appearing a few hours after it has been passed—the high-coloured urine remaining clear, or having a light cloud formed in it, and depositing usually, a considerable time (from four to twelve hours) after it has been passed, a red crystallized sediment—the high-coloured urine becoming turbid after it has been passed for a short time (from half an hour to two hours), and depositing a light-coloured, sometimes pinky sediment, now and then (after the urine has stood for a longer time) mixed with more or less, if the light-coloured sediment is copious, never with much, of the red crystallized sediment. In almost every disease, as well as in health, the urine occasionally assumes all these appearances.

* Lecture on Typhus Fever.

sweating could be induced, it would have a salutary tendency. On this point it is only necessary to observe, that however beneficial moderate spontaneous perspiration undoubtedly is, permanent abatement of the febrile symptoms seldom follows diaphoresis when artificially induced. When the sweating is so profuse as to induce exhaustion, or when it is partial or clammy, it is unfavourable; and though as a general rule, when critical sweats appear, little should be done, if the strength be evidently lowered, or if there be not corresponding amendment in the general symptoms, they should if possible be checked.

It is remarkable, however, that in those kinds of fever in which there is great weakness, profuse long-continued sweating has been often observed to be most salutary. We are informed by Dr. Donald Monro, that in the petechial fever sweating often continued with the best effects for three or four days. Hoffmann also observed, as a peculiarity of this fever, profuse cold sweats of an acid smell, continuing for days and nights, and proving (apparently) a salutary crisis.

When moderate diarrhœa comes on towards the termination of fever, it is generally a favourable circumstance, and ought not to be interfered with. When there has been a disposition to relaxation of the bowels throughout the disease, which is not uncommon in some epidemics in which gastric symptoms predominate, or at particular seasons, the irritation commonly subsides spontaneously; should it even continue through the period of convalescence, provided it do not interfere with the recovery of the patient, it is only necessary that the diet and general management be duly regulated. When the diarrhœa appears to retard recovery, and produce gradual emaciation, the practitioner should never lose sight of the possibility of the affection being the result of inflammation of the mucous membrane of the bowels, or of other intestinal lesions, and therefore requiring the most vigilant care. From these observations it appears, that although diarrhœa does occasionally come on towards the close of fever, and in such instances may be said to be critical, yet no positive conclusions can be drawn from this symptom—that when moderate it may be salutary, when excessive it retards recovery, and in many cases appears to indicate some of those intestinal lesions which generally prove fatal.

Though critical hemorrhagies are mentioned by many of the older authors as occasional occurrences in fever, we confess that in our individual experience we have never witnessed such a crisis of fever. The inference is, that the occasional hemorrhagic action (more common in the fevers of hot countries) which has been observed in some cases to take place spontaneously, and to be followed by a salutary effect, has been improperly termed *critical*. We have repeatedly observed such spontaneous hemorrhage from the nose when there was considerable cerebral affection, and always re-

marked the great relief which followed this salutary evacuation; but we have never met with an instance in which the fever disappeared with the epistaxis. In typhous fever, hemorrhage from mucous surfaces and from the skin (petechiæ) at any period of the disease, but more particularly in the advanced stages, is not unusual. These hemorrhages are never critical; they tend to lower the already exhausted powers of the patient, and always indicate an unusually severe, if not a fatal form of fever.

Enlargement of the absorbents (more especially of the cervical and parotid glands) occasionally takes place towards the termination of fever. This is more common in some epidemics than at other times, and though resolution generally takes place when the inflammation extends to the cellular tissue surrounding the gland, it terminates in suppuration. Abscesses occasionally form in different parts of the body towards the decline of fever, and have therefore been regarded as critical.

Eruptions of the skin have also been observed towards the decline of fever. The appearance of aphthæ on the tongue, lips, and inside of the mouth, has been thought an unfavourable circumstance in fever, as indicating debility. Though we do not think the supervention of any eruption a desirable event, we have never observed an unfavourable result in such cases as have been accompanied with aphthæ.

Herpes about the mouth and ears towards the termination of fevers is to be regarded as a salutary crisis.

The ancients also believed that fevers had a fixed or determinate duration, and that these terminations happened on certain days in preference to others. The days on which continued fevers are said more particularly to subside, are the third, fifth, seventh, ninth, eleventh, fourteenth, seventeenth, and twentieth. De Haen collected from the writings which have been supposed to be the productions of Hippocrates, the results of the termination of one hundred and sixty-three cases of fever. Of these it is asserted that more than two-thirds terminated on one or other of the eight days above-mentioned; none occurred on the second or thirteenth day, and only one-third of the whole terminated on the eighth, tenth, twelfth, fifteenth, sixteenth, eighteenth, and nineteenth days.

Of one thousand seven hundred and seventy-three cases of which an account of the days of decline was kept by Dr. Stoker, two hundred and sixty-two occurred on the seventh day, two hundred and twelve on the ninth, one hundred and seventy-three on the eighth; on the fifth, sixth, tenth, eleventh, and twelfth, nearly an equal number, (about one hundred and twenty;) from the thirteenth to the thirty-first days, the number pretty uniformly decreases from eighty-two to two.

From the difficulty of ascertaining the actual commencement and decline of the symptoms

of fever with accuracy, besides that the disease is more protracted in its duration at some periods than at others, we are not inclined to consider these observations of much practical value.

Not only did the ancients suppose that fever terminated at certain determinate periods, but Galen affirmed that, after careful observation, he had been able to discriminate those days on which fever terminated favourably or unfavourably. Thus he asserted that the majority of fevers terminated favourably on the seventh day, a large proportion on the fourteenth; next in order he placed the ninth, the eleventh, the twentieth, or twenty-first, the seventeenth, the fifteenth, the fourteenth, the third, the eighteenth, the twenty-seventh or twenty-eighth. The sixth day, according to Galen, was always most unfavourable, fevers which terminated on this day being either in general fatal, the crisis imperfect, or the patient liable to relapse. Other unfavourable critical days were the eighth, the tenth, the twelfth, the sixteenth, and the nineteenth. The thirteenth was regarded as neither favourable nor unfavourable.

We do not enter into these details of supposed critical days, with the most distant wish to perpetuate what certainly appears a fiction, but to endeavour to guard the inexperienced against doctrines which deserve notice only from their antiquity.

It should be remembered that we have no grounds for ascertaining how time was calculated in those early days; besides the difficulty of ascertaining the precise hour or period of invasion, and the time occupied by the gradual and often imperceptible changes which announce the crisis. We know also that the duration of fever varies according to climate and the particular character of the epidemic: besides, we have endeavoured to shew that there are, comparatively, very few cases of fever in which some local inflammation does not exist at the beginning, or arise at some period of its progress, and which most materially interferes with any supposed regular duration.

It must be apparent, also, that the symptoms of fever may be not only mitigated, but their duration shortened, according to the treatment which has been adopted: indeed, fever is often rendered exceedingly tedious, either from neglect in its early stage, or from the sufferer being placed under circumstances which preclude the possibility of those means being applied which are most effectual in checking the progress of the disease.

These remarks are intended to apply to the various forms of continued fever. We admit that in periodic fevers the symptoms have a certain duration, and that in the eruptive fevers, (small pox, measles, and scarlatina,) the symptoms have also a fixed period of cessation or decline, unless their regular course be interrupted by the supervision of some local affection, or some peculiarities in the epidemic itself. These circumstances certainly, at first sight, give countenance to the doctrines we

are now impugning; but when we consider the many circumstances in which eruptive fevers differ from every other form of acute disease, their almost invariably fixed duration cannot be adduced as an argument in favour of the doctrine of critical days in continued fever.

Prognosis.—Although a considerable proportion of cases of fever recover, it is to be regarded as a dangerous disease. For the first few days its character may be mild, but symptoms often arise in its progress which place the patient unexpectedly in danger; while, on the other hand, the patient may recover from a combination of the most unfavourable circumstances.

In the first place, the prognosis will depend on the type of the fever, and the complications which arise in its progress. Simple fever, being the mildest, is the least dangerous form; indeed it seldom proves fatal, unless from the supervision of some local inflammation. Of the probable issue of complicated fevers, it may be said that this depends both on the importance of the organ affected, and the intensity or degree of the local disease. Cerebral is more dangerous than pulmonary or abdominal inflammation; and the various intestinal lesions are more dangerous than any form of pulmonic affection. If there be local disease in more than one organ, the prognosis must of course be less favourable than when the affection is confined to a single organ.

Of the prognosis of typhous fever, it may be stated that it is the most dangerous form of fever. Its fatality is materially influenced by the symptoms which arise, by the character of the prevailing epidemic, and the mode of treatment pursued. Indeed, every species of fever varies in severity in particular years, and even in particular periods of the same year. It is not easy to account for such variation in epidemics, nothing beyond the fact having been hitherto ascertained.

In the second place, the prognosis will also, in some degree, be influenced by the age of the individual. It is more fatal at some periods of life than at others. The following table will give a comparative view of the mortality of fever at different ages. It is abstracted from the records of the London Fever Hospital.

Under 10 years of age there died 14	
From the age of 10 to 15	40
15 to 20	118
20 to 25	84
25 to 30	73
30 to 35	25
35 to 40	39
40 to 45	30
45 to 50	29
50 to 55	14
55 to 60	12
60 to 65	6
65 to 70	9
70 to 75	5
75 to 80	2
	<hr/>
	500

In the third place, the constitutional powers and previous habits of the individual will also materially influence the probable result of the case. Persons of a robust vigorous frame and sanguine temperament in general pass through fever better than those of a melancholic temperament and feeble powers; and those who have led a temperate life are more likely to escape the ravages of fever than such as have impaired their constitution by intemperance and excess.

In the fourth place, particular symptoms indicate a favourable or unfavourable prognosis. In acute diseases, and more especially in fevers, it is of great consequence to examine into the various conditions of the pulse. In fever we are to be guided chiefly by its frequency and volume. If it do not exceed 100 or 110 at any period of the twenty-four hours; if it be at the same time soft though not very compressible, and if the pulsations be regular, the indication, so far as the circulation is concerned, may be considered favourable.

The state of the respiration is also to be considered. If it be of natural frequency, or only a little accelerated towards evening, or at those periods of the day when an accession of fever comes on, resuming its natural state when the exacerbation abates, and is not attended with cough, it is favourable. Auscultation generally indicates the presence or absence of pulmonary disease; and as we have already seen that latent pulmonary affections may be going on without any external signs—cough or alteration in the respiration—frequent examinations of the chest by the stethoscope should be made.

In detailing the symptoms and explaining the causes of fever, we have seen the prominent importance of the nervous system: its condition, therefore, must in every instance materially influence the prognosis. If the headach, or giddiness, which almost invariably accompany the disease, continue moderate, or when in its progress they have become severe, but have yielded to appropriate measures—when moderate delirium does not come on till towards the middle of the second week of the disease, and appears chiefly towards the evening—when the patient enjoys intervals of refreshing sleep—or, if the sleep be protracted, he be easily roused from his slumber—if with these symptoms the state of the eyes and expression of the countenance be natural—or should moderate deafness without pain in the region of the ear supervene, a favourable result may be anticipated.

In no disease does the appearance of the tongue afford more satisfactory information than in fever. If, after it has been covered with thick moist fur, it appear cleaner at the edges, or after having been dry and parched, it become clean and moist round the margin, it is a favourable circumstance—more particularly if this change be accompanied with desire for food and abatement of the thirst, heat of skin, and other symptoms.

Another favourable symptom is the appearance of a warm general perspiration: it must, however, be distinguished from a cold,

clammy, or partial sweat, or from that occasioned by external heat.

A moderate spontaneous diarrhoea is often a salutary crisis of fever, and if it do not prove exhausting, should not be interfered with.

The prognosis may in some measure be formed from the posture of the patient. When an individual labouring under fever is able to change his position, and to retain it for any length of time, it is a favourable circumstance, shewing that a degree of muscular vigour still remains, and that the powers are not unduly exhausted.

The state of the blood, should there arise necessity for venesection, affords an important indication: if it flow readily when the vein is opened, and if on cooling the coagulum be firm and abundant, it is favourable, shewing that the system is in a vigorous state.

The unfavourable symptoms of fever may be classed under two conditions—those of undue or excessive excitement, and those of failure of the vital powers.

Under the first may be classed those symptoms which characterise great febrile excitement, more particularly violent action of the heart and arteries, pungent heat of skin, hurried breathing, headach, excessive thirst, and general functional disturbance. These symptoms are more particularly observed in the fevers of warm climates, in which all acute disorders run a rapid course, and are often very fatal. In such cases the excitement may be general, without any marked disturbance in any organ; and although this general excitement has been known in some instances to prove fatal without inducing any inflammatory complication, more commonly some organ becomes, sooner or later, inflamed, and according to the extent of the lesion produced, the danger of the patient is to be estimated.

When symptoms denoting inflammation of the brain come on, viz. acute pain in the head, delirium, suffusion of the eyes, throbbing of the carotid and temporal arteries, rolling of the head from side to side on the pillow, drowsiness or coma, the prognosis is unfavourable, especially if such symptoms occur in an enfeebled constitution, which forbids the adoption of such active measures as are necessary to subdue the local disease.

Again, if inflammation of the lungs or pleura, or of any of the abdominal organs, supervene, the particular lesion being recognized by particular symptoms, the prognosis is unfavourable, unless the local affection be speedily arrested. The safety of the individual in all such cases depends on the promptitude and judgment with which the treatment is pursued, and on the powers of the patient being adequate to contend with the disease and the treatment it requires.

The prognosis, however, is not to be deduced from general symptoms alone, but in connexion with the condition of the vital functions. Hence an unfavourable prognosis may be drawn from the following circumstances.

Extreme frequency and feebleness of the pulsations, exceeding 120 in the minute, indicate danger; when they exceed 130, the case may be considered nearly hopeless. Intermission or irregularity of the pulse is also a bad symptom. This state of the pulse no doubt depends on spasmodic action of the muscular structure of the heart, arising from the same causes which induce muscular tremor and subsultus tendinum, as we have observed irregularity or intermission of the pulse accompany the general muscular affection, and subside at the same time under a cordial plan of treatment and opiates. On the other hand, it may happen that fever has supervened on some organic disease of the heart which has given rise to the irregular action: these cases can only be ascertained by stethoscopic examination and the previous history.

The condition of the brain in fever affords many indications both favourable and unfavourable. We have already adverted to those symptoms which may be regarded as favourable. Of those which are dangerous, we may mention early delirium, which, although by no means a fatal, is always an unfavourable symptom. Coma indicates great danger. Muscular tremor of the hands, tremulous motion of, or inability to thrust out, the tongue, starting of the tendons, spasm of the diaphragm indicated by hiccup, great failure of muscular power, so that the patient cannot sustain his position on either side, but lies on his back sunk in the bed; involuntary evacuation of the urine and stools; or the opposite condition—retention of urine and difficulty of swallowing, indicate much danger.

Though the low or typhoid fevers are generally accompanied with symptoms of impaired energy in the brain, it should be kept in mind that subacute cerebral inflammation sometimes supervenes under circumstances of great general debility. Such a combination generally proves embarrassing, the practitioner having to contend with inflammatory symptoms, while the general powers are enfeebled and exhausted, or, as Dr. Bateman remarks, "the nature of the one affection absolutely contra-indicating the treatment, which the nature of the other as decidedly requires." When convulsions occur (which they do rarely) they always indicate speedy dissolution.

Loss of sight, although it seldom occurs, is invariably a fatal symptom. Partial paralysis of the retina, indicated by the appearance of black spots, called *muscæ volitantes*, floating before the eyes, picking at the bed-clothes—or endeavouring to catch or drive away imaginary objects—closure of the upper eyelid, which arises from debility of the levator palpebræ superioris; or the patient going to sleep with the eyelids half closed, may be regarded as alarming if not fatal signs.

Dropping of the lower jaw, so that the patient lies with his mouth open, the jaw-bone falling down from its own weight, in consequence of paralysis of the temporal and masseter muscles—grinding the teeth, which is

produced by spasmodic affection of the muscles of the lower jaw, denote great danger.

Another set of unfavourable symptoms which may be referred to the disorder in the brain, are great restlessness, tossing the arms about, and uncovering the body, though the skin be cool.

Any remarkable deviation from the natural state of the respiration or voice in fever is always to be considered unfavourable. The alteration in the tone or strength of the voice, not depending on the dry state of the mouth, throat, teeth, and lips, which prevents the free use of the organs of speech, arises from loss of power in the muscles of the larynx. When the breathing is hurried without any corresponding disease in the respiratory organs, it is a bad omen, shewing that there is great debility. When there is intense pulmonary inflammation, either bronchitis, pneumonia, or pleurisy, there is considerable danger. That form of pulmonary disease to which the French writers have given the term *latent bronchitis* is always a dangerous and often fatal complication. It is not indicated by any pathognomic symptom, and is only detected by auscultation; and when it occupies both lungs, it speedily destroys the patient. The obscurity of pulmonary disease in fever is often owing to the condition of the brain, and hence the indispensable necessity of the frequent application of the stethoscope in the progress of fever.

The symptoms in the alimentary canal which give an unfavourable aspect, are fiery redness of the tongue, its middle or root, as well as the teeth, being covered with dry, black sordes; or a preternaturally clean, red, dry, or fissured tongue—tympanitic distension of the belly, with or without pain on pressure—exhausting diarrhoea, the evacuations, consisting of light yellow, serous fluid, being passed unconsciously—hemorrhage from the bowels or bladder. These symptoms are always of themselves exceedingly unfavourable, as they indicate severe lesion of the mucous membrane of the intestines, and when accompanied with sympathetic sensorial disturbance, the issue of the case is seldom doubtful.

Another very alarming and always fatal symptom is sudden acute pain in the abdomen, followed by vomiting, rapid distension, collapse of the features, and extremely small, quick pulse. The pain at first is confined to a limited space, but it soon becomes diffused over the abdomen. These symptoms indicate intestinal perforation, which, it is unnecessary to add, is always a fatal event.

There are certain external symptoms in fever which assist the physician in determining the probable issue.

The expression of the countenance always affords an indication of much value; so much so that those who are familiar with the disease can often pronounce with great accuracy as to the condition of the patient from attentive observation of the countenance alone. It is difficult, if not impossible, to describe the various changes in the countenance in fever: they are known only to those who

have had much experience in this disease ; and a knowledge of them can only be acquired at the bed-side. In mild cases, there is little alteration from its natural aspect, and should any circumstances arise in the progress of fever sufficient to produce change in its expression, a sure indication of amendment is improvement in the expression of the countenance.

In almost every instance patients become thin under fever ; and unless the emaciation be excessive, it is a more favourable symptom than when there is comparatively little wasting of the flesh. When the patient emaciates rapidly, so that he becomes almost a living skeleton, it is generally owing to lesion of some internal organ, very often of ulceration in the bowels. In these cases the prognosis is unfavourable.

We have already alluded to the fetor of the body in some forms of fever. This sometimes arises from inattention to cleanliness when the patient passes his evacuations unconsciously, but more commonly from a vitiated state of the secretions, and consequently of the perspiration. It is always a bad symptom.

Exudation of blood from the vessels of the skin giving rise to petechiæ, or vibices, is an unfavourable symptom, shewing great general debility and relaxation of the capillaries, the blood being at the same time deficient in fibrin. Huxham observes,* " that when black, livid, dun, or greenish spots appear, no one doubts their malignity ; the more florid, however, the spots are, the less is to be feared : it is a good sign when the black or violet petechiæ become of a brighter colour. The large black or livid spots are almost always attended with profuse hemorrhagies. The small dusky brown spots, like freckles, are not much less dangerous than the livid and black, though fluxes of blood do but seldom accompany them. The vibices, or large livid or dark greenish marks, seldom appear till very near the fatal period."

When parts which are subjected to pressure shew a tendency to gangrene, it is an unfavourable sign : in some cases large sloughs form on the sacrum or hips, and produce so much constitutional irritation as ultimately to destroy life. Coldness of the extremities, denoting failure in the nervous energy, though often observed two or three days before the patient dies, indicates the near approach of death. The same indication may be taken from cold sweats, which are also referable to failure of the circulation and relaxation of the capillaries. When the extremities become cold, the surface bedewed with a cold, clammy sweat, the countenance collapsed, the respiration short, interrupted, or laborious, the fatal issue is not far distant.

Causes of Continued Fever.—It has been well remarked by Dr. John Hunter, in his work on the Diseases of the Army in Jamaica, that the great improvements to be made are not so much in the cure as in the prevention of dis-

eases, which depends altogether upon the knowledge of their causes.

The causes of fever have been usually considered under two divisions. The first comprehends those circumstances which predispose to, or render the body susceptible of the operation of the causes which produce the disease : they are termed *predisposing*. The second includes such causes as immediately excite the fever, and are consequently called *exciting*.

1. *Predisposing causes.*—From this distinction it may appear that a certain predisposition is necessary before the exciting causes can produce their effect ; or, in other words, that a predisposition must exist, or be engendered before symptoms of fever can be established. Although a certain condition of the system renders the operation of the exciting causes more efficient, and in some cases contributes essentially to bring on the disease, the exciting causes frequently operate, without the intervention of the predisposing. It has not unfrequently happened that individuals in perfect health, on being exposed to infection, have almost immediately been seized with fever.

A woman admitted into the fever-wards of the Whitworth Hospital stated that on a certain day (Wednesday) preceding the day of her admission, a person not yet recovered from fever came into the house where she then was, and sat down close beside her. She became immediately sensible of a heavy, disgusting odour arising from the person of this individual ; was instantly affected with headach and became very weak ; and on the same evening, long-continued rigors, followed by heat and perspiration, came on. She afterwards passed through a severe form of fever.

A clergyman, having enjoyed during the morning his usual health, and having performed the customary church-service of the day, visited, before dinner, a small parochial fever hospital. While speaking to a woman recovered from fever, he discovered he was standing on straw just removed from the bed of a fever-patient, in which there was much feculent matter. The odour from thence struck him with force ; he immediately felt pain in his head, sickness, and prostration. The same evening he shivered, and fever of unusual severity ensued. Though little hopes were at one time entertained of him, he ultimately recovered.*

A child, on being discharged from a fever hospital, was admitted into a charitable institution, and brought with her a small bundle of clothes which had not been disinfected. The bundle was opened by a woman resident in the institution, who perceived an extraordinary disagreeable odour to issue from it. In a few minutes the woman became ill, felt sick at her stomach, and afterwards passed through fever.†

Nurses, too, have become so powerfully affected on removing the evacuations of a

* Marsh on the Origin of Fever, *Dubl. Hosp. Rep.* vol. iv.

† Barker and Cheyne's Reports, vol. i. p. 472.

* On Fever, chap. viii.

fever-patient, or from applying dressings to gangrenous sores, as to sicken with fever almost immediately after. Instances of this kind are familiar to the writer, and have no doubt been often remarked by other physicians.

It has been confirmed by experience, however, that when the system is in full health and vigour—when all its functions are duly performed and nicely balanced, it is enabled to resist any powerful morbid impression. As soon as this equilibrium is disturbed—when the powers are enfeebled from any cause which tends to break up the strength, or to destroy that harmony of relation which constitutes health, the same causes which were formerly innocuous, become powerful agents in the production of disease. It is on this principle that attendants on fever patients are enabled to resist infection so long as they continue in full health. Hence an important practical principle is deduced, that those who are engaged in attendance on fever should not approach the sick while any symptoms of even slight indisposition are felt.

In all the instances of medical practitioners who have become the subjects of fever, which have come under our notice, there have been almost uniformly, for some time previous to the origin of the disease, evident signs of disordered health. It very generally happens that when precursory symptoms of fever appear, the struggle made against its insidious approach too often renders the subsequent progress formidable, while under early judicious management the primary symptoms might have soon subsided.

It may be useful to point out a few of the more striking and important circumstances which render the system susceptible of the influence of the exciting causes of fever. The first to be noticed is the particular period of life at which fever most frequently occurs. That some idea may be formed of the comparative frequency of fever at different ages, the following table has been constructed from the register of patients admitted into the London Fever Hospital during one year.

Under 10 years	18
Between 10 and 15	68
15 and 20	130
20 and 25	178
25 and 30	100
30 and 35	44
35 and 40	44
40 and 45	31
45 and 50	14
50 and 55	10
55 and 60	8
60 and 65	8
65 and 70	2
70 and 75	3
75 and 80	1
Ages not ascertained....	17
324 males }	
352 females }	..Total.. 676

From this abstract it appears that fever is most common between the ages of twenty and twenty-five, and next between fifteen and twenty. It decreases in frequency from the age of puberty downwards; and as a general rule it may be affirmed that children, and particularly infants, are peculiarly exempt from the exciting causes of idiopathic fever—the febrile ailments to which they are subject being almost invariably symptomatic of some local disturbance, such as dentition and disorder of the bowels. The frequency of fever between the ages of fifteen and thirty may be explained by the development which takes place and the tendency to plethora in young persons. It may also be stated that the type of fever is apparently influenced by the particular period of life—inflammatory or acute fevers being more common from puberty to the age of forty. It is also modified by individual temperament, persons of the sanguine being most liable to the acute, those of the melancholic to the low forms of the disease.

We have already noticed how much a vigorous state of health contributes to protect the system against the influence of the exciting causes of fever: it consequently follows that whatever tends to impair the health becomes indirectly a predisposing cause. Those circumstances which induce plethora on the one hand, or inanition on the other, may therefore be regarded both as predisposing and exciting causes, according to the duration of their application and the condition of the system at the time they are applied. Of the two, however, scarcity or famine is the most powerful: indeed, in all ages famine and disease have been observed to be co-existent. Hence it may be considered as an axiom, that scarcity of food, as well as food of a bad quality or improper kind, powerfully predisposes the system to the influence of the exciting causes of fever.

In tracing the records of epidemics, it will be found that they have almost invariably been preceded or accompanied by distress among the lower orders, either from the high price of provisions, or from some commercial causes, throwing the manufacturing portion of the community out of employment. In the epidemic fever which has at various times visited Ireland, all the medical practitioners allude to the inadequate supply of food among the inhabitants of the towns or districts where it raged. Insufficient and unwholesome nutriment, by impoverishing the blood, not only brings on emaciation, but depresses the nervous energy; hence the system, under such circumstances, is readily acted on by the exciting causes of fever. In times of pestilence, therefore, due attention should be paid to the quality as well as quantity of the food, avoiding on the one hand too scanty an allowance, while on the other, the stomach should not be overloaded, especially with stimulating food. We consider a moderate but liberal allowance of animal food to be a good preservative against the exciting causes of fever. This observation is

strengthened by the fact, that during the plague, which raged in London in the seventeenth century, the butchers of the metropolis were observed to be remarkably exempt from the disease, and in our own experience butchers are rarely the subjects of fever.

The moderate use of wine, by strengthening the body, obviates a predisposition to fever, and therefore, during the prevalence of epidemic fever, has been recommended. It should, however, be strongly impressed on the mind, that the immoderate use of wine or intoxicating liquors, under such circumstances, actually renders the body more susceptible of the exciting causes. Dr. Chisholm remarks that those who were addicted to intemperance, were most subject to the fever of Grenada; and as every kind of ardent spirits operates as a slow but sure poison, producing great debility, and sapping the powers of the system, it is the duty of every one to discourage their use in the time of epidemic visitations.

Bodily fatigue may be mentioned among the causes which tend to impair the natural vigour of the body, and thus render the system more susceptible of the exciting causes of fever. This may be either excessive and of short duration, as in violent exertion, or it may be prolonged, as in long journeys. It is well known to army surgeons, that soldiers very readily fall into fever, when exposed to its causes, after a long march or severe and continued exertion in the field; and, in times of scarcity and privation, the journeys which whole families are not unfrequently compelled to take in quest of employment and support, render them more liable to be attacked with fever than they otherwise would be.

Another set of predisposing causes are those which give a severe shock to the nervous system. The various kinds of mental emotion—fear, grief, anxiety, disappointments, long continued watching on a sick bed, intense study, want of sleep, may individually be ranked among the predisposing causes of fever. As Dr. W. Philip observes, therefore, few things are better preservatives against infection than fortitude and equanimity. Nothing, we are informed by those who voluntarily exposed themselves to the contagion of the most pestilential fevers, was found so great a preservative against its effects, as a steady adherence to what they believed their duty, banishing from their minds, as much as possible, all thoughts of danger, and avoiding every kind of passion, particularly the depressing passions. Every body knows how much fear predisposes to infection: on this account it is of consequence to strengthen the faith of the ignorant in the efficacy of any thing they believe capable of preserving against infection.*

2. *Exciting causes.*—The *exciting* causes of fever form a most important and interesting subject of investigation, though it must be acknowledged that notwithstanding all that has

been done in this department of etiology, the subject is still involved in obscurity.

There can be little doubt that the opinion, entertained by many, of the exclusive origin of all forms of continued fever in contagion, has tended much to limit our knowledge of its other causes. That fever does occasionally originate in contagion few persons of experience or unbiassed judgement will now deny; but there are other causes which operate with equal certainty, a knowledge of which it is exceedingly important to attain.

The records of medicine contain abundant proofs of the origin of fever in the poison generated by the decomposition of vegetable and animal matters, though it seems probable from some facts, that the exhalation from vegetable substances in a state of putrefaction is more injurious than that from animals; and from the circumstance of the prevalence of fever in some particular places, and the number of persons who have become affected from residence, even for a short time, in those situations where it has been found to prevail, it has been concluded that fever may arise from a terrestrial or atmospheric poison generated in such localities. To the febrile poison however produced, the term *miasm*, (from the Greek word importing pollution, corruption, or defilement generally,) or *malaria* (from the Italian term implying bad or impure air,) has been applied. It is well ascertained that vegetable as well as animal substances, in a state of decomposition, emit effluvia or exhalations which prove extremely hurtful to the human body, and when applied in a state of sufficient concentration are productive of most severe illness, or even of instantaneous death. On this account, all febrile poisons have been supposed to originate in one or other of these sources, or in a peculiar unknown pestilential condition of the atmosphere, to which, from the number of persons simultaneously affected, the term *epidemic* has been given.

We know very little about the physical qualities of these emanations or vapours beyond their noxious effects on the animal body: they are invisible and without taste or smell: chemistry has failed to unfold their nature, as on submitting them to the test of chemical analysis, nothing beyond the fact that they contain a considerable proportion of hydrogen and carbonic acid gas has been discovered. Hence some ingenious persons have endeavoured to deduce the unhealthiness of low damp situations in the warm season, to a supposed deficiency of oxygen in the atmosphere, though, as Dr. Bancroft has very justly stated, were we to assume this principle, fever should be produced by every crowded assembly, and in a multitude of situations where no such effects have been observed.

It would appear from fever arising in particular localities, that noxious exhalations are generated from some soils only, and that the combination of heat and moisture is also necessary for their production. We find, accordingly, that in the same district, one place

* On Febrile Diseases.

or spot is unhealthy, while at a very short distance, perhaps, the inhabitants are remarkably free from disease; and that, in some seasons which have been remarkably dry, even when the heat has been unusually great, fever is either little prevalent, or entirely unknown.

Though every soil contains an admixture of animal matters in a state of decomposition, it is probable that the deleterious principle which gives rise to fever is derived from vegetable substances almost exclusively. This opinion is strengthened, if not confirmed, by what is observed to take place during the process of preparing hemp, flax, and indigo for the various purposes for which they are used in commerce.

These plants in their preparation are steeped in water, and during their decomposition extremely offensive emanations arise. Lancisi gives the history of an epidemic fever, which for several summers infested and almost depopulated a town situated in an elevated and salubrious part of Etruria. This fever arose from the emanations from ponds or stagnant waters in the lower part of the town in which hemp and flax were macerated: on the process being afterwards prohibited, there was no recurrence of fever. Dr. Bancroft states he was informed at Naples that in several places near that city, and particularly in some beyond the Grotto of Posilippo, sleeping in houses contiguous to ditches in which hemp or flax were macerating had been almost constantly followed by fever. Similar effects have been observed from the fermentation which the indigo plant undergoes in the process for extracting the colouring matter. It appears that, after the extraction of the dye, large heaps of the plant are formed near the manufactories and houses of the work people, for the purpose of undergoing decomposition so as to form manure. After being frequently moistened by the heavy rains, and heated by the rays of a scorching sun, copious exhalation takes place from these beds of putrifying vegetable matters, in consequence of which the workmen, and persons who live near, were constantly attacked with dangerous fevers. This circumstance having of late years attracted the attention of the indigo planters, the plant, after the extraction of the dye, is not permitted to be formed into heaps near the works or dwellings of the labourers. Fevers are consequently now comparatively rare among the workmen.*

From these facts it would appear that there are some deleterious emanations emitted during the putrefactive process of vegetable matters. Some have endeavoured to shew, however, that moisture alone, applied to the living body, produces fever. This position has been again and again disproved by the most conclusive facts; indeed, the argument adduced by Dr. Bancroft, of the remarkable healthiness of the men employed in the Newfoundland fisheries, where they are generally enveloped in the dampest fogs for several months together,

affords the least ambiguous proof, that the atmosphere when loaded with moisture only, has no greater power in causing fever, than it has when in any usual state of dryness.

It would appear that a combination of circumstances, more particularly heat and moisture, is necessary to give potency to putrid emanations.

Miasmata generate very slowly in a perfectly dry situation; and it has been generally remarked that fevers are not prevalent in dry seasons. Dr. Bancroft states that it is found on the west coast of Africa, and in some of the West India islands which are liable to long droughts, as Barbadoes, and more particularly Antigua, that marsh fevers occur very seldom in dry seasons; but that they become every prevalent whenever these droughts are suddenly terminated by frequent rains.

Dr. James Clark, in his Treatise on the Yellow Fever, observes that when there was much rain in the months of May and June, and dry sultry weather prevailed in the following months of July and August, fever raged much among the troops and strangers. This is precisely what is observed to take place in the fevers of temperate countries.

The effect of heat in promoting putrefaction, and the consequent generation of emanations, is evident from the variation observed in the putrefactive process in different temperatures. A very low or a very high temperature is unfavourable to the decomposition of dead inorganic matter, putrefaction being entirely suspended at the freezing point, and proceeding very slowly at any degree under 45° of Fahrenheit: it gradually increases from this point, and appears to take place most readily about 100°, but to be checked when the temperature exceeds 100°. It has been remarked that in districts where marsh fevers are prevalent, their progress is arrested, and in many places they entirely disappear during a continued frost: when spring advances they reappear in a mild form; in summer they prevail more extensively; and in autumn the cases not only increase in number, but assume a more severe form. Precisely the same thing happens with regard to the continued fevers of temperate countries, so that the combination of heat with moisture must be admitted to be a powerful circumstance in the production of fever.

It is necessary, however, to state that paludal emanations are generated in greater quantity, and probably in a state of greater concentration, when there is only such a degree of moisture as facilitates putrefaction.

It is well known, that in marshy districts fevers do not appear in the rainy season till the water has nearly evaporated or drained off; and, as Dr. Bancroft states, attention to this important fact will enable us to understand, why in some countries frequent and heavy rains render marsh fevers prevalent, while in others the deprivation of rain for two or three months produces equally morbid effects.

The fact that in very dry seasons fevers are seldom observed has been already noticed; in

* Bancroft on Yellow Fever.

very low situations, where the ground is much moistened and often inundated in the rainy seasons, the inhabitants remain free from fever till the water evaporates from the heat of the weather so as to leave the ground in many places uncovered. The comparative insalubrity of situations in the vicinity of stagnant waters compared with running streams is thus explained.

In the third volume of the *Journal de Physiologie*, an interesting account is given of a fever which occurred in the autumn of 1822; its origin was ascribed to exposure to the emanations of stagnant waters, and using the same water in food. The symptoms of the fever were pain in the epigastrium, purging, distention of the belly, feeble pulse, thirst, black furred tongue, fetid sweats, and great prostration. The convalescence was remarkably tedious. Hence the expediency of occasionally inundating a marsh in hot weather, when any deleterious exhalation arises.

There is considerable difference in the various kinds of soil as regards the generation of emanations. Fevers have been generally remarked to be more common when clay constitutes a considerable proportion of the soil. Whether this is owing to the greater humidity of a clayey soil, or whether it favours the putrefactive process more than other kinds, is yet a matter of conjecture.

We may here allude to the singular exemption of persons who live near peat-bogs or moors from marsh fevers; this has been observed to be remarkably the case in some districts of Scotland and Ireland. The cause of this apparent salubrity in the districts referred to has not been satisfactorily explained, but it is well known that peat-bogs have the remarkable property of preserving both dead animal and vegetable matter from putrefaction. According to Dr. Bancroft, not only plants and trees, but even human bodies with their clothing, when completely immured in the peat soil, will scarcely undergo any change during a long course of years; and it is probably owing to this peculiar property that they do not exhale, and perhaps do not generate, miasmata similar to those which arise from marshes. Some chemists who have made experiments with a view to discover the nature of peat, are of opinion that its antiseptic powers are derived from *tannin*, though from a certain quantity of iron being always found in peat, it is probable that this metal may have a considerable share in contributing towards its antiseptic properties.

From what has been stated, it is evident that not only the origin but the propagation of fever depends on a great variety of circumstances, which, in tracing the causes of the disease in any particular locality, should be minutely investigated.

It is often found that fever is confined to a limited district, so that one part of a town is sickly while other districts are healthy. This has been repeatedly remarked in the malarian fever which prevails in the summer and

autumn at Rome, the disease appearing chiefly in the low parts of the city near the river, while the other districts are quite free, unless when the wind blows in the direction of the Pontine Marshes. Particular streets have been observed to be more unhealthy than others; and it has been said that fever has run through every house on one side of the street, while the inhabitants of the opposite side escaped.

Ample proofs of the injurious effects of emanations from vegetable substances in a state of putrefaction on the living body having been adduced, let us next examine into those arising from the decomposition of animal matter. It would appear, however, from the immunity of persons exposed to the effluvia of dead animal matter, that its application to the living system is rarely followed by any injurious consequence. Persons who are much exposed to animal putrefaction, such as the men who are employed in particular trades, skimmers, parchment-makers, catgut and glue-makers, nightmen, and students of anatomy who are engaged for several hours daily in prosecuting their anatomical studies, are seldom known to suffer from their occupation. The same immunity is not enjoyed by persons who are long enough exposed to the effluvia from putrid vegetable substances. It is true that persons who have been engaged in the removal of corpses from burying-grounds, and nightmen, have suffered from their occupation; but the disease occasionally induced in them does not appear to have any resemblance to fever.

Fourcroy states that in some of the burial-grounds of France, when the grave-diggers in opening the ground penetrate graves in which bodies have been recently placed, they become affected with vertigo, sickness, tremors, and a feeling of oppression; in some instances they become asphyxiated: it has also been observed that numbers of those who live in the vicinity of cemeteries labour under dejected spirits, sallow countenances, and febrile emaciation.

The human body, not only when affected with disease, but under certain circumstances in a state of health, generates a poison which gives rise to fever. This principle, notwithstanding the reasoning of ingenious disputants, has been incontrovertibly established by a multiplicity of facts.

There can be no doubt that the most potent febrile poisons are the exhalations from the bodies of persons labouring under some form of fever. The proofs on this point are so clear and satisfactory, that few persons deny that fever originates in contagion. To assert that contagion is the only principle capable of producing the disease evinces a very limited notion of the circumstances under which fever is generated; and yet this opinion was taught by Cullen, and is implicitly believed by many even in the present day. It is almost as absurd as the idea still entertained that fever cannot be propagated by contagion. Sir John Pringle states that he has observed the hospitals of an army, not only

when crowded with sick, but at any time when the air is confined, and especially in hot weather, produce fever of a peculiar kind which is often mortal. The same thing has been observed in almost every hospital, and shows that the congregation of sick persons does, under some circumstances, produce fever.

It is not necessary however that such exhalations, in order to generate fever, should arise from the bodies of persons in a state of disease: it is well known that fever is readily produced by the accumulated emanations of healthy persons. Sir John Pringle mentions that he had observed fever arise in full and crowded barracks, and in transport-ships when filled beyond a due number, and detained by contrary winds, or when the men had been long kept at sea under close hatches in stormy weather.

We have frequently observed that the febrile poison becomes so virulent in a confined atmosphere, that every person who has been exposed to its influence has been attacked with fever; and as if to show the agency of a specific poison, the symptoms in every individual who has received the infection have been remarkably similar.

It is this concentration of human effluvia which is so productive of fever in crowded ships, prisons, and workhouses, more particularly in warm weather, and when little attention is paid to ventilation; for it should be remembered that the febrile poison may be so diluted by pure air as to be rendered almost innoxious. Few parish workhouses, when overcrowded with paupers, especially in the summer months, escape the visitation of fever; and when an epidemic appears in a large town or manufacturing district, the ravages which it commits in the crowded ill-ventilated dwellings of the poor are often appalling.

The facts which have been accumulated from the most authentic sources prove that fever may be communicated from person to person by contagion. It does not require actual contact to produce the disease; exposure to the atmosphere of the apartment, but more especially to the exhalation from the body of a fever patient, being sufficient. In the article *CONTAGION*, (to which we refer for more ample details,) such abundant illustrations have been brought forward, that the most sceptical must be convinced of the origin of fever in this source. We certainly think that Dr. Marsh, in his paper on the origin of fever,* has brought forward a body of evidence which should alone decide the question. The facts there collected are corroborated by the experience of every fever hospital as to the medical officers, nurses, and immediate attendants on the sick, and every inmate of the establishment, of whatever description, being with few exceptions affected with fever. We have known many instances of nurses pointing out the very patient from whom they received the infection; others have been sensible of a sudden and particular impression

at the moment the poison was received. This impression has been sometimes from the fetor of the body, not unfrequently from the stools, or in removing the linen of the patient.

Persons in a state of full health and vigour are much less likely to become affected with fever, than those whose powers are exhausted. It is on this principle that the nurses and attendants in fever hospitals resist for a time the febrile poison; but after a longer or shorter exposure, more especially if the strength has been impaired by bodily fatigue, want of sleep, and close confinement to the sick room, they almost invariably lapse into fever—a convincing proof that whatever weakens the general strength tends to render the operation of the exciting causes of fever more certain and effectual.

Any undue mental fatigue also powerfully aids the operation of the exciting causes of fever; and we have often verified the remark of Dr. Marsh, that in such cases the violence of the disease falls on the brain and nervous system, producing what is emphatically termed *brain fever*.

In the same manner we may explain satisfactorily the rapidity with which contagion spreads in times of scarcity or famine. The poor under such lamentable visitations are generally exposed to circumstances, which render them readily affected by causes which under more favourable events would be inoperative. Fatigue, exposure to cold and wet, insufficient or improper kind of food, are the too general attendants of epidemic fever among the poor.

Though mental emotion of a depressing kind powerfully predisposes the system to fever, it is singular how much an unusual degree of excitement acts apparently as a preventive. It is not unusual to observe that, during the painful anxiety and suspense, between hopes and fears as to the recovery of a valued relative and friend, the body is as it were armed against the effects of contagion. When this state of excitement is withdrawn, it is frequently followed by the same disease which was the cause of such intense anxiety, as if, in short, the system became relaxed so as to receive the influence of the infection to which it had been exposed.

From what has been stated, it is evident that when there is any indisposition, exposure to contagious fever should be avoided.

The means of guarding against contagion must at once suggest themselves. These consist in ventilation, separating the healthy from the sick, avoiding the effluvia from the skin, from the breath, and more especially from the evacuations; in adopting a nutritious but not stimulating diet; and in preserving moral courage,—fear, as we have stated, always predisposing the system to infection, so much so, that during the prevalence of an epidemic disease the terror it induces tends materially to increase the number of its victims.

The following brief sketch of fever originating in long-continued mental anxiety, by

* Dublin Hospital Reports.

Dr. Cheyne, vividly describes a not infrequent and somewhat peculiar form. "The *causes* are loss of property, of character; wounded pride. *Invasion* insidious, indistinct, patient generally unable to assign the date of the commencement of the attack; for some time before he has been complaining of bad nights, or has had symptoms of a common cold, which almost insensibly degenerate into the proper symptoms of fever; then, from an ignorance of the nature of his illness, he neglects himself, perhaps for many days; and at last when visited by a physician, he appears utterly unconscious of the formidable nature of his disease, and probably says he has no complaint—he is merely very weak: the symptoms are those of the typhus gravior of nosologists; a red suffusion of the eye; prostration of strength; subsultus tendinum; quick and weak pulse; hurried breathing; dun petechiæ, or a mottled or morbillary state of the surface. Of such patients a great proportion die. The most remarkable part of the disease is that it does not spread." Dr. Cheyne has no recollection of a second case of this kind of fever occurring in a family, and he has never been able to discover that the patient had been exposed to contagion. It would seem to arise solely from mental causes.*

Few circumstances connected with the causes of fever have attracted more attention than its tendency to become epidemic and to prove malignant and fatal at particular times, while at others the disease is little prevalent and of a mild character. These variations in febrile diseases have existed in all ages; they were particularly remarked by Hippocrates, who ascribed them to something divine, in which idea he was followed by Galen. In more modern times, these differences have been ascribed to the influence of some atmospheric or terrestrial agency, of which little or nothing is known except the effects it produces in the propagation and malignity of diseases. The notion that such pestiferous causes depend on planetary influence has been long exploded, though they appear to have an intimate connexion with sudden and extreme variations of temperature, more especially excessive heat combined with moisture. It is by no means uncommon to observe the prevalence of fever sensibly checked when the air is dry and cold.

Other contagious diseases as well as fever become epidemic and malignant at particular periods. This has been more especially observed with regard to small-pox, measles, and scarlatina, which, though never extinguished, are more frequent at some periods of the year, as well as more malignant at certain seasons than at others.

It is probable, therefore, that the circumstances which contribute to the prevalence as well as malignity of febrile diseases, operate by increasing the predisposition, or by rendering the body more susceptible of the influ-

ence of their various exciting causes. Hence the obvious effect of living in confined places, or of scarcity, or of any causes that undermine the powers of the system, in rendering the exciting causes of fever operative.

Not only is there a great difference in the number of persons affected with fever at particular times, but there is often, also, a remarkable similarity in the symptoms. Thus in the winter and spring months, the fever is of a more acute character, and generally complicated with cerebral or pulmonary inflammation. In the autumn, they are of a less active kind, and accompanied with more or less gastric irritation.

It is impossible, in the present state of our knowledge, to account for these various modifications in the character of fever, though it is of the greatest importance to observe them with the view of regulating the treatment.

Climate has an important influence, not only in giving a predisposition to fever, but in modifying its character or type. The inhabitants of warm climates are more liable to fever than those who reside in cold or temperate countries. The symptoms also are generally more violent, and the progress of the disease more rapid, while the type of the fever is very liable to change. The predisposition to fever, however, diminishes by continued exposure to its causes, and hence the immunity frequently observed in the natives of warm climates, while strangers or new comers are almost invariably attacked soon after their arrival, with the peculiar fever of the country.

We have already alluded to the effect of heat in the production of fever. The negative principle *cold* has been usually placed among the exciting causes. Though, undoubtedly, cases of mild fever may be traced to exposure to cold, it is more probable that it acts as a predisposing cause, especially when the body is weak, and little able to resist its effects. Dr. Marsh is of opinion that cold, like contagion, is an impression made on the sentient extremities of the nerves; its effects are in like manner instantaneous; its action, though powerful, is resisted when the body is vigorous and strong, but its impression upon those who are exhausted, fatigued, or relaxed, is followed very frequently by consequences formidable and even fatal.

It appears from some facts which have been noticed, that while some individuals are enabled to resist the operation of the exciting causes, others are only indisposed in a peculiar and indefinite manner after exposure to them, as if there were a struggle in the system to obviate their effects.

Fever, moreover, has been apparently induced by exposure to other acute diseases. Dr. Marsh mentions the case of a nurse in Stevens's Hospital, who was suddenly seized with illness while in the act of turning in the bed a boy labouring under confluent small-pox. She remained ill but not incapacitated for business for three days. She then had rigours followed by severe fever, the ordinary

* Marsh on the Origin of Fevers, Dub. Hosp. Rep.

typhus of this country. Dr. Johnson asserts that he observed in some instances that the ward-maids of the lying-in hospital caught typhous fever from the patients then affected with puerperal fever.

It would be exceedingly important if the mode in which the various febrile causes produce their effects could be satisfactorily demonstrated. It appears evident, from attentive observation of the general characters of fever, that there is occasionally a very remarkable difference in its forms or types, as well as in the particular symptoms on which its distinctive varieties have been founded.

The local lesions or complications, we have seen, assume remarkable variation in certain seasons and in particular epidemics, both in respect to the organs individually affected, and in the degree or intensity of such local inflammations. These circumstances lead to the belief, either that the febrile poison is different at different times, or that it is so modified by the state of the system as materially to alter its effects. The former is the more probable explanation, though from the nature of the febrile poison such difference cannot be demonstrated, but is only rendered probable from its effects on the human body.

Though it is impossible to explain the operation of all the exciting causes of fever, there appears to be a very close analogy in the action of many to that of other poisons. We know that this class of agents (poisons) affect different structures: the narcotics, for instance, act on one organ—the nervous system; others have a twofold action, as in the instance of the acro-narcotics, which evidently operate both on the nervous system and on the mucous membrane of the bowels, giving rise in the former to peculiar symptoms of narcotism, while a more severe effect is produced on the latter—inflammation and its consequences.

It cannot be demonstrated, but it seems more than probable, that some of the febrile poisons, whether originating in animal, vegetable, or atmospheric miasmata, operate on particular structures.

In some cases it would appear that the brain and nervous system are the only organs affected by the febrile poison; at all events, the nervous system appears to be early, if not primarily disturbed, as is evident from the shock which the whole system receives on exposure to some of the causes alluded to.

The symptoms in the brain are not, however, always the effect of the primary action of febrile causes on this organ. The nervous system is so susceptible of distant sympathetic impressions, that there is often great difficulty in distinguishing primary from secondary cerebral disease in fever. When there is intestinal affection more especially, the brain always sympathises; in which case it is often very difficult to determine whether the cerebral disturbance arise from the peculiar operation of the febrile poison on the nervous system, or whether it be only sympathetic of the morbid condition of the alimentary canal.

Again, fever assumes particular forms at different seasons of the year. It is well known that in some epidemics, and at certain seasons, the mucous membrane of the air-passages is affected, the existence of this form of fever being indicated by the catarrhal symptoms which accompany it. There seems every reason to believe, that at those periods when epidemic catarrh or influenza appeared, and of which Sydenham, Huxham, and Baker have given faithful and valuable reports, some peculiar condition of the atmosphere prevailed.

In like manner, in the autumnal months, the symptoms of gastric disorder form the prominent character of the fever. We have seen also that intestinal affections are not only more common at particular times, but occur in a larger proportion of cases in some localities than in others. This evidently arises from some circumstances peculiar to those situations. The effect of terrestrial emanations, rendered virulent by long-continued rains in hot climates, in producing dysentery, has been remarked by many writers and army-physicians.

We shall next consider how far morbid states of the blood are to be regarded as exciting causes of fever.

The ancient writers ascribed with great truth the origin of many diseases to a morbid condition of the blood and humours; and though the cultivation of anatomy has led to the investigation of the solids as the great source of diseases, yet that many arise from a morbid state of the blood is admitted even by the warmest adherents of solidism.

No one doubts that scurvy depends on vitiation of the blood in consequence of improper diet or living in an unwholesome atmosphere, and that in its progress (whatever cause may have produced the alteration in the blood) various local diseases take place; shewing, as Andral remarks, "that many lesions, apparently inflammatory, are far from depending simply on a local morbid state, but being connected with certain conditions of sanguification, can be removed only by a return of that process to its natural condition."

Sir John Pringle mentions a remarkable fact which came under his personal observation, of a person being seized with dysentery by making experiments upon human blood, which had become putrid by standing some months in a close phial.

M. Gendrin injected one ounce of blood, drawn from the veins of a patient labouring under putrid fever, into the cellular tissue of the groin of a cat. Copious vomiting, dyspnoea, small, frequent, irregular pulse, dry brown tongue, great prostration, and slight convulsions before death, were the effects which followed this experiment. The animal died within seven hours after the operation.

Duhamel has related the case of a butcher who suffered from a most malignant disease, and which proved fatal in four days, from putting into his mouth the knife he had employed in slaughtering an ox that had been

overdriven. An innkeeper wounded himself with a bone of the same ox in the palm of his hand; the arm mortified, and he died in seven days. In two women who had received some drops of the blood of the same animal, the one on her hand, the other on her cheek, the parts to which the blood was applied were seized with gangrenous inflammation.

It is well known that specific febrile diseases, small pox, and even measles, can be produced by inoculation; and that these diseases, as well as the syphilitic poison, may be communicated through the umbilical circulation from the mother to the fetus in utero, while a healthy infant after birth may become affected with syphilis from the diseased milk of an infected nurse. It has also been asserted "that in females who have died during pregnancy from the effects of some deleterious poison, the same specific agent which the mothers had used has been found in the blood taken from the heart of their dead infants."*

In females who are chlorotic, the blood is altered in its physical characters, and is apparently the cause of this singular disease. It is deficient in the solid or fibrinous principle, and consequently it is thin and pale, and scarcely tinged with red. The symptoms in this affection are so general, that we may safely affirm that every organ and function of the body suffers more or less.

It is not uncommon also for leeches to die immediately after they have sucked the blood of some persons. Cases of this kind have been occasionally recorded.† In these cases the presumption is, that some deleterious agent has been mixed with the blood, which has proved fatal to the leeches.

The following is a singular instance of a vegetable poison entering the circulation, and producing no injurious effect on the animal, but afterwards producing fever, and even death in those who use its milk.

A plant, which is called by the natives the *Indian Hachy*, grows in Tennessee, on the banks of the river Cumberland, and in other parts of the western district of the United States of America, and is so poisonous, that a small quantity of the milk of cows that have fed upon it, mixed with tea, produces most violent fever, and in some cases even death. The following account of the disease produced by this poison is given by Dr. Macall:—"After swallowing the milk, the person in a short time suffers from thirst, nausea, vertigo, confused or imperfect vision; vomiting often ensues, succeeded by violent fever, the exacerbations subsiding at irregular intervals. The pulse is extremely variable, sometimes strong and full, at others, tremulous, small, and corded. Constipation, which exists from the beginning, becomes more obstinate towards the third or fourth day. The skin also about

this time is more hot and parched, the eyes are red and suffused, there is very great restlessness, and all the secretions are scanty. Towards the sixth and seventh day excessive debility takes place, with very often paralysis of the tongue and other parts; and soon after ensue stupor, cold clammy sweats, convulsive hiccup, and often offensive cadaverous odour, and death."*

Dr. Haines, in his account of this disease, which the natives call *the trembles*, observes, "that the heart beats with such violence in some cases as to excite horror in the physician and bystanders. When they lay the hand upon the patient's breast, it seems to labour convulsively, and as though it were clogged in its action by a superabundance of blood. The patient feels nothing he can strictly call pain; but the sense of heat, the oppression, the palpitation of the heart, and the violent efforts to vomit, constitute an extreme degree of distress."

It is also stated that the milk and flesh of animals killed while labouring under this disease will produce disease in other animals. Sucking calves, which have had no food but the milk of an affected cow, show the peculiar symptoms, and often die of the disease. Persons also making use of the milk or butter from the same cow have become affected.

In an instance of a whole family becoming sick with this disease, (some of them in a few hours after dining upon a loin of veal,) it was afterwards satisfactorily ascertained that the calf, which was sold in the market by an unprincipled person, laboured under the disease at the time it was butchered. In another instance several persons became severely affected from incautiously eating of a pig, which had been fattened upon the milk of a cow that was known to be affected with this disease: all of the family who ate of it were seized, some of them in a few hours.

These facts lead to the conviction, that many diseases are produced by a morbid state of the blood.

We formerly adverted to the revival of the opinion among modern pathologists, that a certain class of fevers arise from this source. Many writers who have observed the fevers of hot climates, (Warren, Hume, Hillary, Stevens, and others,) describe the altered state of the blood in the ardent malignant fevers, and from the accounts given by some physicians of the fevers of hot climates, it is more than probable that the diseased state of the blood precedes and is the cause of the febrile symptoms.

In the Genesee country (the lake country of the United States) there are extensive swamps, so that in the hot months there are certain localities in which fever prevails extensively. Dr. Stevens states that during his residence in that country he bled several individuals who resided in some of the most sickly places, but who had not yet been at-

* Observations on the Healthy and Diseased Properties of the Blood, by Wm. Stevens, M.D.

† Christison on Poisons. Medical Gazette, February, 1831.

* Philadelphia Journal, 1822.

tacked with the fever. The blood was very dark in colour, and evidently deranged in its properties.

Dr. Potter, with the view of proving the non-contagious nature of yellow fever, which had been very fatal at Baltimore, observes, "it was remarkable in all cases in which it was deemed expedient to bleed, the blood wore the same general appearances. After a separation had taken place, the serum assumed a yellow shade, often a deep orange, and a portion of the red globules was invariably precipitated. It occurred to me, that if the remote cause resided in the common atmosphere, the blood of all who had inhaled it a certain time would exhibit similar phenomena. It accorded with the pathology I had conceived to conclude, that all who lived in an atmosphere so inquinated were constantly predisposed, and that an additional or exciting cause only would be required to develope the symptoms in form. To ascertain the appearances of the blood in subjects apparently in good health, I drew it from five persons who had lived during the whole season in the most infected parts of the city, and who were, to every external appearance and inward feeling, in perfect health. The appearances of the blood could not be distinguished from that of those who laboured under the most inveterate grades of the disease. As this experiment might have been considered inconclusive, unless the blood could be compared with that of those who lived in a purer atmosphere, remote from the evolution of miasmata, I selected an equal number of persons who dwelt on the hills of Baltimore county, and drew from them ten ounces of blood. The contrast in the appearances was so manifest, that no cause for hesitation remained. There was neither a preternaturally yellow serum nor a red precipitate: the appearances were such as we find in the blood of healthy subjects. A young gentleman having returned from the western part of Pennsylvania, on the 10th of September, I drew a few ounces of blood from a vein on that day; it discovered no deviation from that of other healthy persons. He remained in my family till the 26th of the month, and on that day I repeated the bloodletting. The serum had assumed a deep yellow hue, and a copious precipitate of red globules had fallen to the bottom of the receiving-vessel. Of the six persons whose blood assumed those indications of the remote cause, four were seized with fever during the epidemic; the other two escaped any formal attack, but complained occasionally of headach, nausea, and other indications of disease. Hundreds who were not confined, and who never took medicine, experienced the effects of the general cause, under a variety of forms, such as nausea, giddiness, headach, constipation, a pale or yellow face, tinnitus aurium, pains in the extremities, and some other light shades of incipient indisposition. In some there were premonitory symptoms of a formal attack; in others they vanished, leaving the subject in

his usual health. Many were listless, complaining of universal languor, indisposed to muscular exertion, yet did not surrender to the disease. They were neither sufficiently indisposed to be placed on the sick-list, nor well enough to pursue their ordinary occupations."*

With respect to the state of the blood in fevers of temperate countries, Dr. Mead says, "Pestilential fevers, in fine, I call all those which are accompanied with some sort of poison. Now of whatever nature this happens to be, it not only infects and corrupts the blood, but seizes upon the subtle nervous liquor. Hence it is, that these fevers act with greater rapidity and violence, and are much more fatal than the common sorts."

Dr. Stoker conceives typhoid or adynamic fever to be generally symptomatic of morbid changes in the physical character of the blood. He states that the crassamentum is dissolved, or broken into fragments, tinging the serum with its colour, which is sometimes of a very dark brown, and sometimes of a greenish hue. These changes he considers to be intimately connected with disturbance or failure of the vital power in the process of sanguification; and that the morbid changes which take place in the blood become, in proportion to their degree, the source of morbid action.†

Dr. Clanny has adopted views nearly similar, from observation of the gradual changes in the blood from the commencement to the decline of fever.‡ He has shewn the difference in the component principles of the blood according to the stage of the disease, that the blood loses a proportion of its solid ingredients as the fever advances, which it afterwards gradually regains as the fever declines. He firmly asserts his belief, however, in these various changes in the blood being the effect of disease in the solids.

The idea, that certain forms of fever originate in a morbid condition of the blood, is further supported by the peculiar symptoms which follow from poisonous wounds in dissection, or in the preparation of putrid game. The symptoms in these cases closely resemble those of typhous fever, and the description given of the effects of introducing putrid fluids into the veins of animals. Whether the opinion of the older writers, that in fevers originating in contagion the contagious principle alters the properties of the blood, be correct or not, we certainly think the strong analogy in the cases alluded to tends to confirm the supposition of typhoid fevers originating in diseased blood.

There has been much ingenious disputation on the question, whether the alteration in the blood be the cause or the effect of the disease in the solids. It appears probable, if not

* Memoir on Contagion, more especially as it respects the Yellow Fever, by Nathaniel Potter, M.D. Baltimore, 1818, p. 53.

† Report of the House of Recovery and Fever Hospital, Cork-street, Dublin, 1829.

‡ Lecture upon Typhous Fever.

certain, from what has been advanced, that in a certain class of fevers (typhoid) the blood is primarily diseased, and that certain changes in one or more organs take place as a consequence, or secondary effect. On the other hand, from various circumstances, as well as from some recent experiments (by Dupuytren, Mayer, and Dupuy), it may be inferred that the solids, more particularly the nervous system, effect most important and sensible changes in the constituent principles of the blood.

On this subject Andral remarks that "no line of demarcation can with strictness be drawn between the blood and the solids. Physiologically speaking, it is impossible to conceive that one of these two parts of the same whole could be modified without the other being so likewise. On the one hand, inasmuch as the blood nourishes the solids, and as, without its presence, they cannot support life, the state of the solids cannot but be influenced by the state of the blood. The chemist might as well say that the nature of a body does not depend on the nature of the elements that compose it. On the other hand, the solids, considered with respect to their relations to the blood, form but two classes; the one contributing to *make* the blood, such as those concerned in the actions of absorption, digestion, arterial circulation, and respiration; the other contributing to *unmake* it, those, namely, concerned in the actions of venous circulation, secretion, and nutrition. No one solid, therefore, can undergo the slightest modification without producing some derangement in the nature or quantity of the materials destined to form the blood, or to be separated from it. Physiology then leads us to the conclusion, that every alteration of the solids must be succeeded by a modification of the fluids. Viewed in this light, there is no longer any meaning in the disputes between the solidists and humorists; the system appears to constitute but one great whole, indivisible in the state of health as well as in that of disease. The division of the parts of the body into solids and fluids seems to be a distinction of small importance, and one that is not always just, since it ceases to exist in the intimate structure of the organs, in which all the grand vital phenomena take place, and in which also occur all the changes that constitute the morbid state."

It is probable that when certain external agents alter the properties of the blood, and thus induce fever, the changes take place in a very gradual and almost imperceptible manner. If, for example, an individual who has been accustomed to a pure air, be exposed to an unhealthy tainted atmosphere, or to marsh miasms, or if his food be of an unwholesome kind, or insufficient as to quantity, he is observed gradually to droop, to emaciate, and to lose his natural energy: he may for a long time struggle against this incipient form of disease, but at length symptoms of fever become developed. Under these circumstances, it is very probable that the blood has been undergoing

gradual changes from the time that the system was first exposed to the causes adverted to; in the one case, the unhealthy atmosphere has altered the qualities of the blood; in the other, the unwholesome kind or scanty supply of food has produced bad chyle, which, by entering the circulation, taints the general mass of the blood.

It would thus appear, that when the various exciting causes produce fever by their action on the solids, the febrile phenomena take place speedily, while those acting on the blood produce their effects in a gradual, slow, and often imperceptible manner.

Treatment of continued fever.—Before deciding on the measures to be adopted in the treatment of any disease, it is requisite that the practitioner should have correct ideas of its nature in order that the principles or indications of cure may be successfully applied.*

In no class of maladies is this more essential than in continued fever, which, we have seen, assumes so many modifications, arising chiefly from the various circumstances in which it originates, and the local inflammations with which it becomes complicated. When those points are considered, it will be evident, that the treatment must be adapted to the circumstances of each case. Not only are the precise form of the fever, and the presence or absence of local congestion or inflammation to be ascertained, but the duration of the disease, the age, the sex, and the constitution or powers of the individual—the previous habits or mode of life, the effects of remedies which may have been previously employed, and the character of the prevailing epidemic. Sydenham's remark should ever be imprinted on the practitioner's mind, that the same method which cures in the middle of the year may possibly prove destructive at the conclusion of it; and when he had fallen on the method of treating any species of fever, he was always successful till that species became extinct and a new one arose, when he was again doubtful how to proceed; and, notwithstanding his utmost caution, could scarcely ever preserve his first patients from danger, till he had thoroughly investigated the nature of the disorder.

The ancients entertaining the opinion that the phenomena of fever were the result of certain efforts of the system to expel some noxious agent, observed most carefully the various changes which took place when the symptoms were allowed to run their natural course. They, consequently, watched the spontaneous efforts of the system, and the supposed salutary effects of certain critical evacuations in controlling or removing the various morbid actions. Founding their indications on attentive observation of the va-

* Sentio autem, nostræ artis incrementum in his consistere, ut habeatur historia sive morborum omnium descriptio, quoad fieri potest, graphica et naturalis, praxis seu methodus circa eosdem stabilis ac consummata.—Sydenham.

rious means by which the system apparently effected a natural cure, they did not attempt to interfere with its operations, but were contented to assist these natural efforts by such measures as they conceived most likely to conduce to this end.

Accordingly, the older physicians attempted the cure of fever by promoting, by artificial means, such evacuations as are occasionally noticed to occur when the disease is allowed to pursue its own course, uninterrupted by the interference of art. The symptoms or evacuations which are observed in the spontaneous resolution of fever, and which physicians have attempted to induce by remedies, are vomiting, diarrhoea, sweating, and hemorrhage.

Another mode of treatment has been proposed on the principle that, as fever is frequently a fatal disease, the attention of the practitioner should be directed chiefly to combat the more dangerous symptoms which arise in its progress; and we confess that, in our judgment, this plan is not only more philosophic, but that which is most successful in practice.

We have just stated the indispensable necessity of ascertaining the form of the fever before the indications of treatment are considered; and, as the measures to be pursued are essentially different, according to the type of the disease, we shall treat of the management of each variety in the order of the description given in the history.

Treatment of simple fever.—In the management of the milder as well as the more severe cases of the common epidemic fever, the practitioner would often be more successful in his endeavours to cut short the disease, or to lessen its duration, were medical aid resorted to on the first feeling of indisposition. It too often happens that the primary stage is altogether neglected; the patient, hoping that the symptoms will pass off, and unwilling to believe that he is seriously indisposed, continues to pursue his usual avocations, until he is compelled by increasing illness to resort to medical aid.

In investigating the symptoms of fever, however apparently mild, the condition of the several organs should, in the first place, be carefully examined by every means within our reach, that we may be certain there is no lurking disease to keep up the febrile excitement. The patient, his relatives, and sometimes his medical attendant, are too apt to suppose, that if there be no pain to attract attention to any organ, there is no local disease going on. A very short acquaintance with acute disease, however, will convince the practitioner that, besides pain, (which in many cases of local inflammation is entirely wanting,) there are other symptoms, the presence of which indicates both the seat and intensity of the local affection. Again, when we find one organ more particularly affected than another, although the disturbance be merely functional, this over-action, which often depends on irritation or congestion, should be watched and

controlled, lest it should pass into inflammation.

Having ascertained the condition of the several organs, and being satisfied that there is no local complication, the modified antiphlogistic treatment is to be adopted. Strict quietude should be enjoined; consequently confinement to bed, or at all events to the horizontal posture, abstinence and cessation from all mental effort, are indispensable; fortunately, indeed, the lassitude and languor which attend the very first approach of fever, render the patient averse to exertion either of body or mind.

In every form of fever, the expediency of bloodletting is to be considered. This remedy is not to be indiscriminately employed; but the circumstances of each case weighed, before the practitioner decides on employing or withholding the lancet. We shall therefore consider the circumstances which should regulate the employment of this remedy, as we treat of the measures to be pursued in the various forms of fever.

In the milder varieties of simple fever, bloodletting is seldom required, unless the patient be of a full habit, or the symptoms indicate unusual excitement. Under these circumstances, a moderate bleeding at the commencement of the disease is often of much service in mitigating the symptoms, and preventing local inflammation. Indeed, there are few cases of the acute fever of temperate countries, in which, at the onset, a moderate bleeding is not advisable; and in the fevers of hot climates, which often run their course with alarming rapidity, this evacuation is indispensable.

Physicians of observation and experience have often remarked the different characters of epidemic fever, and are therefore aware that at one period, or in some epidemics, the type of the fever renders the bold use of the lancet necessary, while at another season, or from some peculiarity in the epidemic, which is quite inexplicable, the system will not bear with safety the bold treatment which the previous epidemic required. The character of the prevailing fever, as well as the stage and symptoms of the case, must determine the propriety of bloodletting, and the extent to which it should be carried. Even when, from the nature of the prevailing epidemic, bloodletting is indicated, it should be restricted to the early stages, unless some symptoms arise in the later periods to require it. This remedy is also to be prescribed with great circumspection when the patient is of a feeble constitution, or advanced in years, of intemperate habits, or if there be chronic visceral disease. In such cases, unless there be symptoms which require bloodletting, the modified antiphlogistic treatment is to be adopted, viz. strict rest, antimonials, and purgatives; and should local congestion or inflammation arise, they are to be arrested by the topical abstraction of blood.

The freedom with which some physicians speculate on the safety of large bleedings in

fever has led to very improper notions on this point of practice. A little experience at the bed-side, and attentive observation of the ever varying circumstances which individual cases of fever present, will soon enable an observing, and what is of more importance, a candid practitioner, to form a true estimate of this powerful remedy. Were every patient who is seized with fever to be bled indiscriminately, without regard to age, constitutional powers, previous habits, and mode of living, and more especially to the prevailing character of the epidemic, many lives would be sacrificed by a remedy, which, when judiciously employed, is an anchor of safety.

The action of full vomiting, by the shock given to the system, and by determining the blood to the surface, being frequently followed by marked relief of the general symptoms, has led to the administration of emetics in the early stage of fever. They are therefore to be employed in cases in which bloodletting is considered unnecessary, or in conjunction with this remedy. There are few circumstances which forbid their exhibition, so that, unless, as sometimes happens, the disease be ushered in by spontaneous vomiting, or epigastric tenderness, the patient be plethoric, or there be determination to some organ, more especially to the head, or marked prostration, a scruple of ipecacuanha, with one grain of tartar emetic, may be given in a draught, and its operation promoted and rendered as little distressing as possible by copious draughts of tepid fluids.

The exhibition of purgatives in fever requires as much discrimination as bloodletting. Before the excellent practical work of our much respected friend and preceptor, Dr. Hamilton, appeared, the minds of physicians were fettered by the fear of debility, one of the supposed direct causes of death in fever, and purgatives were prescribed with great diffidence, lest by their operation the spasm of the extreme vessels, and the consequent debility, might be increased. This venerable physician pointed out, in his admirable work, and illustrated by his practice, the advantages of a more liberal employment of purgative medicines in fever. The successful result of this method of treatment, and the inferences which Dr. Hamilton deduced, tended materially to withdraw the minds of physicians from the erroneous theory of Cullen, and certainly laid the foundation of the more extended views of the nature and treatment of fever which have been recently introduced.

The principles upon which this method of treatment should be employed have been misunderstood. If Dr. Hamilton's observations be studied, it will be apparent, that while he recommends the free evacuation of the bowels in the early stages of fever, he deprecates their indiscriminate administration. After detailing the circumstances which first led to his adopting the treatment of fever by purgatives, he states, "if this be a just view of the case, the plain inference is, that, while purgative medicines preserve a regular state of the body,

they do not aggravate the debilitating effects of fever. The complete and regular evacuation of the bowels, in the course of fever, is the object to be attained. Within this limit, I have had much satisfaction in prosecuting the practice; nor have I, in a single instance, had occasion to regret any injury proceeding from it; for I am not an advocate for exciting unusual secretion into the cavity of the intestines, and for procuring copious watery stools; these, while they are not necessary, might increase the debility so much dreaded."^{*} With these precautions, no class of remedies is more beneficial in relieving the primary symptoms of fever, in preventing the accession of more formidable symptoms, and thus shortening the duration of the disease. In the more advanced stages, however, purgatives are injurious by draining too much from the system through the bowels; it is sufficient that the alimentary contents be expelled; and should the secretions, which ought to be daily inspected, appear to be vitiated, mild aperients, containing small doses of mercurial preparations, should be from time to time exhibited.

We cannot deprecate too strongly the practice of administering active cathartics in fever without reference to the circumstances of the case, and more especially to the powers of the patient. Such indiscriminate use of purgatives originates in misconception of the principles on which they should be employed. These remedies should not be prescribed merely because fever exists. In some epidemics and at certain seasons, we have seen that there is a tendency to diarrhoea. It is almost unnecessary to state that under such circumstances aperients are to be withheld, or those only given which tend to correct the morbid secretions.

The doctrines of Broussais as to the pathology of fever have had a salutary influence in checking the abuse of purgatives in the treatment. There is, no doubt, a material difference in the type of the fevers of France compared with those of Britain; there is a greater tendency to gastric irritation, and to those changes in the mucous membrane of the bowels which result from inflammation. We do not, therefore, wonder at the proscription of purgatives by the French physicians, and their extravagant denunciation of the British treatment of fevers. The fact seems to be, that if British physicians were called upon to undertake the treatment of fever in France, they would be less lavish of their purgatives; and on the other hand, after the French physician had seen the character of fever in this country, and thrown aside his preconceived notions and scholastic prejudices, he would acknowledge the utility of the judicious administration of purgatives in the treatment of the fevers of Britain.

The choice of the aperients employed is of less

* Observations on the Utility and Administration of Purgative Medicines in several Diseases, by James Hamilton, M.D.

moment than their due regulation. In the beginning of fever, especially when there is considerable excitement, the more active purgatives, such as calomel combined with rhubarb, or senna with a neutral salt, may be given. Afterwards, such as ensure a full evacuation of the bowels, according to the indication to be fulfilled, are to be employed. In cases in which purging is required, we have found a powder, containing three grains of calomel, two of James's powder, and eight of rhubarb, given at bed-time, during the stage of excitement, answer every purpose; and if a more free action of the bowels be necessary, half an ounce of castor oil, or an aperient draught, may be given in the morning. When the skin becomes cool, and the tongue begins to clean, the calomel and antimonial powder may be omitted, and the regulation of the bowels managed by rhubarb, castor oil, or senna, so as to ensure one or two moderate evacuations daily, while any symptoms of fever remain.

Sometimes the stomach is so irritable that ordinary aperients are rejected, and even increase the irritation; in such cases the bowels are to be opened by injections, by which the large intestines are unloaded, and the peristaltic action of the upper part of the alimentary canal is promoted.

When the fever is fully developed, the skin becomes steadily warmer than natural, especially towards the evening. The abatement of the febrile heat being generally followed by marked relief in the symptoms, and in the patient's general sensations, various means are employed with the view of reducing it. Those means which induce perspiration have been employed with this object.

This attempt to imitate nature was strongly inculcated by Cullen. Spasm of the extreme vessels being the supposed cause of the phenomena of fever, it was imagined that every measure which tended to diminish or remove this state of the cutaneous exhalents would have the effect of subduing the disease. Upon these grounds, the employment of diaphoretics in fever was suggested, and these remedies now constitute a part of the treatment of all febrile diseases.

It should, however, be observed that, although a spontaneous or natural diaphoresis has always a salutary effect in reducing not only morbid heat, but the other febrile symptoms, and occasionally accompanies the crisis of fever, the same relief is scarcely ever observed to follow diaphoresis induced by artificial means; and if it be attempted by stimulating or healing drugs, or confining the patient to a warm room, and loading him with bed-clothes, the febrile symptoms, instead of being allayed, are increased. If, however, moisture of the skin can be promoted by saline preparations, such as the acetate of ammonia, with antimony or ipecacuanha, assisted by tepid diluents, the morbid heat of the skin is generally reduced, and the feelings of the patient and general symptoms are ameliorated.

The employment of refrigerants is another

mode of diminishing the morbid heat of the skin in fever. Various internal remedies are prescribed with this view. The mineral and vegetable acids being useful in quenching thirst and cooling the surface, either may be employed according to the feelings of the patient; the most agreeable and convenient form of the latter is, the native vegetable acids contained in fruits, such as the lemon, orange, and tamarind. These may be taken in moderation if they agree or the bowels be not purged. Sometimes the saline refrigerants, such as the citrate or the nitrate of potash, are employed in preference to the acids. Not unfrequently the patient has a desire for cold drinks; the most grateful during the first few days of the fever being cold spring water, which, if preferred, may be freely allowed, and the diluted sulphuric or nitric acid occasionally added.

Very little dependence however should be placed on diaphoretics or refrigerants; their efficacy is very doubtful, while they often seduce the practitioner from more active measures.

A more effectual mode of reducing the morbid heat is by the free external application of cold. The admission of cool air is of much importance in all acute diseases, but more especially in fever. Those who are conversant with the treatment of fever among the poor are well aware of the favourable changes in the symptoms which are often rapidly produced, after patients are removed from their filthy abode to a well ventilated chamber, or to the ward of an hospital. The whole complexion of the disease is frequently altered in a few hours. In every case of fever the temperature of the apartment should be duly regulated; the air renewed from time to time, the linen (both of the bed and of the patient) should also be frequently changed (once a day if practicable), and the bed-clothes adapted to the heat of skin and feelings of the patient.

A more direct mode of applying cold in the treatment of fever is the application of cold water. Though this practice appears to have been known to the ancients, and to have been occasionally employed in modern times, it was not generally adopted as a remedy in the treatment of fevers till Dr. William Wright, formerly of the Island of Jamaica, published an account, in the London Medical Journal for 1786, of the successful treatment of some cases of fever by the ablation of the patient with cold water. He first adopted this practice in his own case, and states that he was encouraged to try it from personal experience of the effect of cool air in mitigating his pains. He succeeded in arresting the progress of the fever after twice applying the cold affusion. The successful issue of this case induced other physicians to give the plan a fair trial. To the late Dr. Currie, of Liverpool, however, is due the merit of having first attempted to regulate this practice from accurate observation of its effects.

When the cold affusion is to be employed, it is proper to ascertain with accuracy the tem-

perature of the patient. The instrument best adapted for this purpose is the mercurial thermometer with a small bulb, and curved at the end. The bulb is to be introduced under the tongue with the lips close, or under the axilla, the heat in these two situations being found by experiments to correspond exactly with, and to give a just indication of, the heat of the surface of the body.

The mode of applying the cold affusion is to have the patient stripped naked, and three to five gallons of water, at the temperature of 40° to 60° (Fahrenheit), thrown over him. The temperature of the water, however, must depend on the season of the year. The average temperature of water may be taken from 40° to 50°—during the summer months it varies from 60° to 70°. The degree of cold, however, is of less consequence in abating the symptoms than is generally supposed.

Water alone may be used, or vinegar or common salt may be added. There may be some slight advantages in the addition of these ingredients; Dr. Currie was of opinion that salt water, besides being more grateful to the feelings of the patient, might be applied to the surface for a length of time with much less hazard. This may be true, but we apprehend the chief advantage of the application of cold in any form, is the rapid abstraction of heat, and the sudden, general, and powerful shock given to the whole system, which induces a sudden salutary re-action.

The effect of the cold affusion, when it is applied with due precaution, is to diminish the morbid heat of skin, lower the pulse, and to induce perspiration and sleep.

As a general rule, the sooner the affusion is applied after the irregular chills of the first stage is over the better, provided the heat of skin is steadily above the natural standard. According to Dr. Currie, the safest and most advantageous time is, when the exacerbation is at its height, or immediately after its declination is begun. The heat at this period rises one or two degrees in the central parts of the body, and still more on the extremities, above the average heat. Dr. Currie, therefore, generally directed its employment from six to nine in the evening, though it may be safely used at any time of the day under proper regulations.

The following precautions are recommended by Dr. Currie, when the cold affusion is contemplated.

1. This remedy should never be used when there is any considerable sense of chilliness, although even the thermometer indicate a morbid degree of heat. If the affusion of cold water on the surface of the body be employed during the cold stage of the paroxysm of fever, the respiration is nearly suspended, the pulse becomes feeble and fluttering, and of incalculable frequency, the surface and extremities are doubly cold and shrivelled, and the patient seems to struggle with the pangs of instant death. Under such circumstances, as Dr. Currie states, the repeated

affusion of a few buckets of cold water would extinguish life.

2. Neither ought the cold affusion to be employed when the heat, measured by the thermometer, is less than, or equal to, the natural heat, notwithstanding the patient feel no sense of chilliness. This is sometimes the case towards the last stages of fever, when the powers of life are weak.

3. It is also necessary to abstain from the use of this remedy when the body is under profuse sensible perspiration, and this caution is more important in proportion to the continuance of this perspiration. In the commencement of sweating, especially if it has been brought on by violent exercise, the affusion of cold water on the naked body, or even immersion in the cold-bath, may be hazarded with little risk, and sometimes may be resorted to with great benefit. After the sweating has continued some time and flowed freely, especially if the body has remained at rest, either the affusion or immersion is attended with danger, even though the heat of the body at the moment of using it be greater than natural. Sweating is always a cooling process in itself, but in bed it is often prolonged by artificial means, and the body prevented from cooling under it to the natural degree by the load of heated clothes. When the heat has been thus artificially kept up, a practitioner, judging by the information of his thermometer only, may be led into error. In this situation, however, Dr. Currie states that he has observed that the heat sinks rapidly on the exposure of the surface of the body even to the external air, and that the application of cold water, either by affusion or immersion, is accompanied by a loss of heat and a deficiency of re-action which are altogether inconsistent with safety.*

According to the experience of Dr. Currie, if employed on the first or second day with the precautions recommended, the progress of the fever is often checked; but it is seldom successful when applied so late as the third or fourth day, though when administered about the eighth or tenth day, or even later, it moderates the symptoms and shortens the duration of the fever.

When the fever is advanced, the heat of the water should not be more than 15° or 20° below the heat of the body. Indeed, when the patient is weak, or when the fever has run on to the ninth or tenth day, sponging the body with cold or tepid vinegar and water is preferable to the cold affusion.

The advantages of the cold affusion in the acute or inflammatory forms of fever have been acknowledged by almost ever writer or practitioner who has adopted the practice. Our own experience of it certainly accords with that of others as to its efficiency in reducing the febrile heat and moderating the symptoms. We freely confess, however, that there are few patients who can be induced to

* Currie's Medical Reports.

submit to a remedy so inconvenient and so repugnant to their feelings; and unless the practitioner can shew urgent reasons for its adoption, he will generally find both the patient and relatives resist the practice. We have certainly never had the opportunity of witnessing a single case out of a considerable number, to which the cold affusion was applied, in which the fever was cut short, though all the patients felt afterwards greatly relieved, and in some the duration of the fever was probably shortened. The practice is best adapted to inflammatory fever (*synocha*) and more especially to the fevers of hot climates, which are accompanied with much greater excitement than those of temperate countries. It should, however, be ascertained in every case, before such a powerful remedy is administered, that there is no visceral inflammation: were such a powerful shock given to the system under such circumstances, dangerous and even fatal consequences might ensue.

We are, for the reasons stated, disposed to recommend in preference the cold sponging or washing of the surface, either with cold water or with vinegar and water, whenever the skin is decidedly hotter than natural. This mode is easily applied, gives the patient no fatigue, and checks those irregular feelings of heat, especially in the palms of the hands and soles of the feet, which are so annoying to the patient, besides, what is of some consequence, producing no alarm. It may not, we admit, be so permanent in its effects as the cold affusion, and certainly cannot be expected to cut short or even to moderate the duration of the fever, but as a grateful means of relieving morbid heat, reducing the pulse and tranquillizing the patient, we submit that it is equally efficacious. This circumstance, with the advantages already stated, has always led us to give the cold sponging a decided preference to the cold affusion.

Dr. Currie applied the *cool* affusion in cases where, from the continuance of the fever or the debility of the patient, the cold affusion was inadmissible. The temperature of the water employed for this purpose should be from 75° to 87°. It is, however, liable to so many objections, and has so few advantages, that in the present day it is almost entirely abandoned.

The warm or tepid affusion (from 87° to 97° Fahrenheit) has been proposed in feeble habits, and when the heat is little above the natural standard; and, according to Dr. Currie, the heat is lowered as speedily by the tepid as by the cold affusion; indeed, he asserts that in some cases the heat is more speedily lowered by tepid water. The tepid affusion is applicable to every case of fever in which the cold affusion is recommended. Its effects, however, are less permanent than those of the cold affusion, besides that it is admitted, even by Dr. Currie, that it never succeeded in shortening the duration of the fever; so that, from the fatigue and inconvenience attending its application,

and its doubtful utility, it is now scarcely ever recommended.

* Washing or sponging the body with tepid vinegar and water is much employed to reduce the morbid heat of fever, and certainly, so far as the feelings of the patient are to be consulted, it is decidedly more agreeable than the application of cold. Some patients prefer cold, others tepid sponging, the former being more grateful in the summer, the latter in the winter months. The choice may, therefore, be left to the patient, either mode of aspersion being preferable to the affusion.

The effect of mercury as an alterative, improving the secretions in fever, is so beneficial, that unless there be some special circumstance in the case to forbid its administration in fever, it should never be omitted, more especially in the fevers of warm climates, or in the more acute forms of fever of temperate countries. The large quantities of calomel (ten grains every three hours) mentioned by Chisholm and other writers, as necessary in the fevers of warm climates, are never to be attempted in the treatment of the fevers of this country. Mercury is more especially useful when the tongue is much coated, the secretions of the mouth clammy and unpleasant, and the stools dark and offensive. It is frequently alone sufficient to regulate the bowels, while at the same time the tongue becomes more clean, and the clammy disagreeable state of the mouth disappears under its use. It is not necessary to push its administration so as to induce salivation, a mild action on the gums being all that is required. When this is effected, the febrile symptoms generally abate. It may be given alone or in combination with an aperient, though we prefer giving two or three grains of the pil. hydr. or the *hydragryum cum creta*, at intervals of six or eight hours; and should an aperient be required, it may be combined with the mercurial preparation, or given alone, according to circumstances. In some individuals mercury induces such irritation as to forbid its internal administration; in such cases it should be exhibited in the form of unguent: a dram of the ung. hydr. may be inserted once a day in the axilla, where absorption goes on rapidly without the inconvenience of friction.

We have often observed the singular immunity of persons under fever from the effects of mercury. This is proved from their resisting this remedy during the continuance of the fever; but as soon as the fever begins to disappear, the mercurial action often becomes perceptible; indeed, patients who could bear the free exhibition of mercury during the fever, but in whom the remedy had been discontinued, are often easily affected by an inconsiderable quantity of this mineral in the period of convalescence.

We have stated our belief that *synocha*, or inflammatory fever, is rarely observed in this country, the few cases which occur (generally in the spring) forming a comparatively small average proportion of the ordinary epidemic fever of Britain.

In the treatment of this variety, it is necessary to keep in mind, not only the more acute nature of the fever, but the greater tendency to local inflammation. It consequently requires more bold and decided antiphlogistic measures, especially bloodletting, purging, and mercury. As it generally occurs in young plethoric persons, bloodletting should always be prescribed in the onset; this not only moderates the violence of the symptoms, but diminishes the tendency to local inflammation.

We have entered at some length into the detail of the various measures which are employed in the treatment of common epidemic fever. It is to be observed, however, that the majority of cases of mild fever do not require the several measures we have pointed out. It is impossible to lay down a general rule which will apply to every case; in one instance, the mildest measures will be sufficient to check the progress of the fever; in a second, more active treatment, bloodletting, smart purging, and the free application of cold, are necessary; in a third, in addition to these measures, mercury may be required. In short, the application of remedies must be regulated and directed by the judgment of the practitioner, according to the symptoms and the character of the epidemic.

2. *Treatment of complicated fever.*—A fever, simple at its commencement, (as far as the negative evidence of symptoms warrants the conclusion,) may become suddenly complicated with local inflammation. The symptoms by which such complications in the several organs may be detected have been pointed out, and although, as a general rule, there can be no question as to the expediency of general bloodletting in complicated fever, it is not advisable to take away the same quantity as in common inflammation. There are modifying circumstances in idiopathic fever on which local inflammation has supervened, so that we find by experience the powers of the patient must be saved for the after conflict, as the fever will certainly run on for some time after the local affection has been subdued.

Dr. Wilson Philip states, "that when visceral inflammation supervenes on idiopathic fever, we must let blood more cautiously than where the former disease exists alone; and in the determinations of blood to particular parts, so apt to occur in fevers, which more frequently consist in distention of the larger vessels of the part than actual inflammation, that is, distention of the capillaries, unless the general excitement is very considerable, it is better to attempt their removal by local than general bloodletting. If there be any exception to this rule, it respects congestion in the head, because, from the nature of the circulation, congestion there is more intimately connected with a state of general excitement than in other parts of the body."

While, therefore, the lancet is to be freely employed if the symptoms demand it, the system is not to be drained of a single ounce of blood more than is absolutely necessary.

The topical abstraction of blood in cases of local inflammation is often very beneficial, and in less urgent cases, sometimes alone sufficient to subdue the local disease. Not unfrequently inflammation creeps on in an insidious manner in feeble exhausted habits; or, as often happens, the local symptoms have been entirely overlooked at the commencement; in these instances general bleeding is inadmissible, and the topical abstraction of blood is the only mode which can with safety be employed. Again, this mode will also often require to be combined with the general measures, or should local inflammation threaten to re-appear, it may be instantly checked by leeching or cupping, and at much less expense to the general powers.

The nervous system being much involved in fever, the brain, but more particularly its investing membrane, the arachnoid, is more liable to become inflamed in its progress than any other organ; the changes which take place in this delicate and important structure being, as we have seen, in many instances, the immediate cause of death. When the symptoms indicate the existence of inflammatory action within the encephalon, no time must be lost in adopting suitable measures. The degree of sensorial disturbance, the presence or absence of pain, the existence and kind of delirium, whether of the high or low character, will point out the nature of the cerebral symptoms. If there be pain in the head, flushing of the face, hot skin, thirst, rapid pulse, acute delirium, (especially towards night,) and watchfulness, we have sufficient evidence of cerebral inflammation to warrant general bleeding, (when there is much excitement from the temporal artery or jugular vein,) followed, if necessary, by the local abstraction of blood from the forehead or nape, and a cold lotion to the scalp.

Another remedy of great power in subduing inflammation of the brain is the affusion of cold water on the scalp. This has been generally termed the *cold douche*. It is as simple in its application as it is powerful in its effects. The patient is raised in bed, the head is then held over an empty vessel, and cold water from a large jug poured on the scalp, the stream being gradually raised as the patient can bear it. A considerable shock is at first produced, but the patient, if he be sensible, expresses great relief, and generally requests it may be repeated. We have frequently seen threatened renewals of cerebral inflammation promptly checked by this treatment, which should always be employed, in some cases as an auxiliary to the other measures, or it is often alone sufficient to keep down the inflammation in weak habits, or when the further abstraction of blood is of doubtful propriety.

The application of blisters to the scalp in cerebral inflammation requires consideration. The too common plan of blistering the head in such instances, before the excitement is diminished by bloodletting, is reprehensible. The application of blisters to the head in fever

should be confined to those cases in which there is danger of the inflammatory action terminating in effusion, or to that particular state of the brain in inflammation, which, though there be no effusion, is attended by coma. Hence when, notwithstanding depleting measures have been judiciously applied, the patient becomes drowsy and insensible to surrounding objects except when roused, a blister may be advantageously applied to the occiput, while an iced evaporating lotion is kept on the forehead, and the system brought under the influence of mercury conjoined with digitalis and squill, so as to promote the action of the kidneys.

There is a form of low delirium in fever which requires to be distinguished from that arising from inflammation of the brain or its membranes. It arises from some peculiar condition of the brain with which we are unacquainted, and may be distinguished from the acute form of febrile delirium, by the pallor of the face, the bloodless appearance of the conjunctiva, the softness of the pulse, the cool state of the scalp, and the absence of muscular twitches. It occurs chiefly in feeble exhausted habits, and frequently in persons who have suffered large losses of blood in the treatment. In other instances it may be traced to intestinal irritation, or some of those lesions in the bowels which so frequently accompany continued fever. This sympathetic delirium is not relieved, but invariably increased by the abstraction of blood. It is best managed by small quantities of nourishment and opiates, with a blister to the nape.

A similar state of the nervous system is often observed towards the termination of other acute and chronic diseases, and also in states of exhaustion induced by injudicious blood-letting or spontaneous hemorrhage.

No class of medicines is more efficacious in removing cerebral inflammation than purgatives; so that, unless there be some special circumstances to forbid their employment, they should form part of the treatment in such cases.

When we have succeeded in arresting the cerebral inflammation, the patient must be strictly watched for some days, as the fever, though moderated, is not extinguished, so that the capillaries are very liable to resume the same action, and thus renew the local disease.

Bronchitis is the most frequent form of pulmonary disease in fever. It is in general easily detected, unless it assume the latent form, when it can only be recognized by auscultation. In severe cases of fever, more especially when the brain is much affected, the frequent application of the stethoscope is indispensable, in order to discover not only the existence but the intensity of this complication. The milder forms of symptomatic bronchitis subside under the use of the measures employed in the general treatment. It is occasionally necessary in addition to apply a few leeches to the chest, and to allay the cough by demulcents.

In more severe cases more active treatment is necessary. General bloodletting possesses less control over this complication than might be expected. More benefit is derived from cupping or the application of leeches to the chest, with warm fomentations diligently applied at intervals of two or three hours. The local bleeding is to be followed by antimonials and a blister. If the bronchitis be not arrested by these measures, large doses of the tartrate of antimony are to be administered. To the efficacy of this remedy we can bear testimony from ample experience. One grain, or in more severe cases, two grains of tartar emetic dissolved in an ounce of any aromatic water, may be taken every two, three, or four hours, according to the exigency of the case. The remedy almost invariably produces vomiting at first, (unless there be considerable torpor from the condition of the brain,) but after three or four doses have been taken, the vomiting ceases, and *tolerance* becomes established. In general this remedy moistens the tongue, and produces softness of the skin, or even diaphoresis; it often, however, produces no sensible effect, except that the bronchitis abates and gradually disappears under its use. When the more urgent symptoms give way, the same dose may be given at more distant intervals, till the remedy be no longer required.

It is necessary, sometimes, to endeavour to allay the distressing vomiting induced by this medicine. This is frequently effected by giving the dose of the tartar emetic in a common saline effervescent draught, to which a few drops of laudanum may be occasionally added.

If it produce purging it must be conjoined with opium; and if, notwithstanding this combination, the purging continue, the antimony must be suspended. In all cases, therefore, when the bowels are irritable, this remedy must be withheld, and the pulmonary symptoms arrested by other measures. If, again, the symptoms of fever be accompanied with great prostration, or if after a fair trial it appear to lower the general powers without subduing the symptoms in the chest, it should be at once withdrawn.

When pneumonia supervenes on fever, the treatment is to be conducted on similar principles. General bloodletting is certainly more efficacious in subduing inflammation of the substance of the lung than of the bronchial membrane, though, unless the symptoms be very urgent, we prefer free local depletion, followed by the exhibition of the tartar-emetic as just recommended, or by calomel and opium with counter-irritation. The calomel and opium may be given, in the proportion of two grains of the former and half a grain of the latter, every three or four hours, till the local symptoms are relieved, when it may be given at more distant intervals, and afterwards withdrawn.

Our experience does not lead us to form a very high opinion of the efficacy of expectorants in symptomatic bronchitis or pneumonia. We have, however, observed good effects from the addition of small doses of ipecacuanha wine,

or of the antimonial wine, to the common saline diaphoretic draught. Still we do not place much confidence in this class of remedies. When the patient is unable, from increasing prostration, to expel the expectoration, carbonate of ammonia, in doses of eight or ten grains in almond emulsion, or decoction of senega, appears often to assist its expulsion.

The occurrence of acute pleuritis during fever is by no means frequent; and when it does take place, it is chiefly in the more advanced stage, or during convalescence. The treatment is very similar to that of pneumonia—local bleeding, calomel and opium, blistering, and purging. Tartar emetic seems to possess little influence over membranous inflammation, and consequently is inapplicable to pleuritis.

The more dangerous form of pleurisy is the chronic, the danger arising from its coming on in an insidious manner, without pain, much acceleration of the breathing, or cough. It is not easily recognised even by auscultation till liquid effusion to a considerable extent has taken place, when the dull sound on percussion of the diseased side, the absence of the respiratory murmur, and the peculiar sound of the voice, (ægophonia,) point it out. The effect of curative measures depends on the state of the membrane, and the extent of the effusion. When the fluid is so considerable as to render its absorption improbable, the operation of empyema is the only resource.

It is proper, however, to bear in mind, that in a considerable proportion of cases of fever, in which pulmonary symptoms predominate, the chest affection is the primary disease, of which the fever is only symptomatic. Many of those cases commence by slow insidious pulmonary inflammation, which, from the comparatively little disturbance it causes, is often allowed to run on until a more acute attack brings the disease under the care of the physician, who has thus to contend with neglected inflammation, over which the most energetic measures too often exert an inefficient control.

When fever is accompanied with symptoms denoting disturbance of the gastric organs, a moderate bleeding from the arm, if the pulse be full, or in less urgent cases, the application of leeches to the pit of the stomach, is often sufficient to allay the irritation. Notwithstanding the relief afforded by bloodletting, it does not appear that the vomiting and epigastric tenderness depend on inflammation, as Dr. Cheyne states that in a case in which considerable tenderness of the epigastrium existed during a great part of the disease, on opening the body not the slightest morbid appearance could be discovered, except a small quantity of bloody serum effused into the cavity of the abdomen, and a very inconsiderable blush in the mucous membrane of the stomach at the cardiac orifice.

When gastric irritation continues during the course of the fever, the plan of treatment recommended in Dr. Cheyne's account of epidemic gastric fever is to be pursued.

We have seen that follicular disease of the intestines, whether primary or secondary, may be going on without being attended by any symptom of gastric disturbance. When, in addition to the ordinary symptoms of fever, the bowels are irritable, and the tongue is morbidly clean and red, or coated at the root, we may infer the existence of gastro-enteritis, or this follicular disease. Our object must then be to prevent, if possible, the destructive changes which take place, whether the intestinal affection be primary, or have supervened in the progress of the fever.

The local abstraction of blood from the surface of the abdomen (particularly from the right iliac region) is to be pursued, to an extent proportionate to the powers of the patient, and the probable duration of the affection. From twelve to eighteen leeches are to be applied, and the abdomen afterwards enveloped in a warm poultice, renewed every two hours. The leeching may be repeated every day, every second day, or at more distant intervals, according to circumstances. The more early the effective measures are resorted to, the greater the chance of preventing the stage of ulceration, which we are convinced cannot be recognized by symptoms. We are aware that Dr. Bright considers the ochry diarrhoea to be diagnostic of intestinal ulceration. We admit that in some cases in which we have found ulceration after death, the stools had this character; but in other instances the greatest variety both as to colour and consistence has been observed; in a few the stools were solid up to the time of death, and in examining the intestines there was a considerable quantity of solid excrementitious matter.

In the majority of instances, however, the stools are watery, and generally contain a large admixture of mucus. If in this condition of the bowels laxatives are improper, restraining the diarrhoea by astringents is equally injurious, unless the patient become so much exhausted by the frequency of the stools that it becomes a matter of necessity to restrain the purging; but the circumstances in which the employment of astringents becomes requisite, rarely occur.

It is a matter of great doubt to our mind how far this follicular disease, except in its primary stage, can be arrested by any plan of treatment. We are not prepared to deny the possibility of the cicatrization of intestinal ulceration, though we think that when it is extensive, the process of reparation rarely if ever takes place. The indication consequently is, to arrest the primary stage of this disease by local bleeding, and afterwards by a combination of mild mercurials with opium. The mercury is not to be pushed so as to affect the mouth; the evidence of the mercurial action on the gums being all that is necessary. Four grains of the hydrargyrum cum creta may be combined with half a grain of ipecacuanha, or, when the bowels are very irritable, with three grains of the compound ipecacuan powder. Either of these formulæ may be taken every four hours. We have sometimes found, in addition to these

remedies, the chalk mixture with laudanum, or an injection containing a drachm of laudanum, at bed-time, attended with good effects.

Dr. J. L. Bardsley of Manchester informs us, that he has been more successful in this follicular affection with a combination of superacetate of lead and opium than by any other remedy. He recommends three grains of the former with half a grain of the latter every four hours. In some cases he has doubled those proportions with marked advantage. Leeches are to be previously applied to the lower part of the belly, and afterwards blisters, or the tartar emetic plaster, and the strength supported by wine and other stimulants. This gentleman adds, that in one or two cases in which the patient had recovered from ulceration, but had perished suddenly from some accidental acute disease, on examination after death, not only was the site of the ulcerations most distinct, and their form and size defined, but unequivocal cicatrization had taken place.

Dr. Bright considers the employment of tonic remedies a point requiring nice discrimination. "With regard to the administration of tonic remedies, there is not a doubt that they are of essential importance; and that even while evidence exists of much local mischief in the bowels, it will sometimes be necessary both to support and to stimulate the system: looking indeed to the character of the ulcerations, the deep sloughs which they often form, and the dark red inflammation which surrounds them, there would be reason to suppose that such remedies might be useful: and occasionally the decidedly remittent form which the fever has assumed, has completely removed every scruple, and led to the free exhibition of the sulphate of quinine with admirable effect. At the same time there is more danger to be feared from the early use of stimulants, as long as the system is still able without their aid to support the feeble prostration, than there is risk in abstaining from stimulants a little beyond the period when they might possibly begin to act well. In a general way the system seems capable of supporting itself for a few days under that great degree of prostration which is connected with advanced ulceration of the bowels; and although we cannot determine the exact state of the ulcers in these cases, yet we find that the action of stimulant and tonic remedies is more certainly beneficial after that state of prostration has existed for some time, than when such remedies are administered with a view of obviating or anticipating the first symptoms of collapse: for when administered too soon, they frequently kindle the inflammatory action with redoubled violence, and then it is that the most appalling combination of debility and nervous excitement is seen for one or two days to precede death."*

While we are watching and endeavouring to subdue the intestinal disease, we are not to disregard the complications which arise in the other organs. The brain and nervous system

are most likely to suffer from sympathetic disturbance, which is to be moderated by leeching, cold lotions, and blistering the occiput or nape.

The diet of the patient forms a most important part of the treatment in this intestinal affection. The blandest nourishment, consisting of milk and water, or thin arrow-root, is sufficient for the early stage. When the patient becomes exhausted, chicken broth or beef-tea may be added in small quantity to the arrow-root; and should stimulants be required, a little wine may be given according to circumstances.

Treatment of typhous fever.—Most physicians who have written on continued fever, though aware of the marked difference between the synchoid and typhoid fevers, have not sufficiently insisted on the modification of treatment which the latter require. It has been too often imagined, that because the symptoms and the morbid appearances observed in the organs after death are scarcely dissimilar, and that other forms of fever do occasionally pass into typhus, the two diseases are identical. Experience, however, informs us that not only the symptoms and progress, but the effects of remedies, are essentially different.

In the milder cases of typhous fever, blood-letting is seldom necessary, and may in general be dispensed with, unless some special circumstance arise to render it expedient; such as severe pain or sense of weight in the head, flushing, intolerance of light, hot skin, and other symptoms denoting a more intense form of fever. With such symptoms at the commencement, the abstraction of a moderate quantity of blood, especially if the patient be young and of a full habit, will be proper. If, however, the pulse, though rapid, be soft and compressible, the tongue begin early to assume a brown tint, and there be considerable prostration, the loss of blood from the system cannot be sustained.

Should a low form of inflammation in the brain, chest, or abdomen, arise, local bleeding, and afterwards counter-irritation, will be the most judicious mode of treatment. The practitioner must, however, be aware, that symptoms in the progress of the disease may render the expediency of general bloodletting a nice question: for instance, inflammation in some important organ may come on suddenly and place the patient in urgent danger. The inflammation may be so acute that local bleeding may fail to arrest it; on the other hand, the complexion of the other symptoms and the duration of the fever may seemingly forbid more active measures. If the local disease be allowed to go on, the fate of the individual is inevitable; if, on the other hand, blood be drawn from the system, when either the powers of the patient, or the experience of the prevailing nature of the epidemic do not warrant the practice, the treatment which the local disease requires may destroy life. The consideration of such a case is most embarrassing, and the result, even under the most skilful management, always doubtful. The rapidity with which the blood flows

* Reports of Medical Cases.

from the vein, and its appearance when drawn, will often afford assistance. If, instead of pouring in a continued stream, it comes in drops, notwithstanding the vein has been well opened; moreover, when it coagulates slowly, the crassamentum is thin and soft, and the proportion of serum abundant, it shows that the abstraction of blood is a measure of questionable expediency. In short, though bloodletting has been recommended in typhous fever from the early ages of medicine, we find even its warmest advocates acknowledge that it is occasionally productive of harm. Sydenham states, "*Quoties mihi cum ægris res est, quòrum sanguis vel per se imbecilior existit (ut fere in pueris) vel justa spirituum copia destituitur, ut in decliviori ætate, atque etiam in juvenibus, diuturno aliquo morbo confectis, a venesectione manum tempero.*" Huxham also remarked, "that in cases in which the blood was dark coloured and exceedingly soft, the pulse often sinks surprisingly after a second bleeding, even indeed after the first, and in individuals whose pulse indicated the propriety of a second bleeding."

Sir John Pringle affirmed that many recovered from jail-fever without bloodletting, but very few who had lost much blood; and Dr. Monro confesses that he was often obliged to give cordials to support the strength after bloodletting.

The other measures which have been recommended in mild fever may be adopted in typhus. The shock of an emetic is useful at the beginning, the more so if there be nausea. When the heat of skin is above the natural standard, cold or tepid sponging is grateful, and allays the morbid heat. Frequent ventilation of the room and changes of linen are also very beneficial.

If the skin be dry, diaphoretics are useful; and should at any time spontaneous diaphoresis come on, it is to be promoted. When copious sweatings appear in the advanced stage of the disease, they should not be interfered with, unless they produce exhaustion, when quinine with diluted sulphuric acid, mild nourishment, and cordials, are to be freely given.

The necessity for purgatives will depend on the condition of the bowels. A mild aperient at the beginning is always proper, to remove any accidental accumulation. The mildest kinds, either castor-oil, rhubarb, or senna, may be prescribed for this purpose, and repeated according to circumstances. When the fever is acute, and the powers are vigorous, the expediency of thoroughly evacuating the bowels, and of abstracting from the mass of circulating fluids through the intestinal exhalents, has been already adverted to. On the other hand, indiscriminate purging is most injurious in any form of fever, but more especially in the typhoid. "I have known," Huxham remarks, "a common purge, injudiciously given at the beginning of this fever, immediately followed by surprising languor, syncope, and a large train of other ill symptoms." Besides, from the greater tenden-

cy to inflammation of the mucous membrane and follicles of the intestines in typhus, every source of irritation, and consequently the stimulus of cathartics, should, as much as possible, be avoided.

If these precautions, as to bleeding and purging, are necessary in the early stage, they are more especially so in the advanced; at which period, such aperients as remove unhealthy secretions, without producing watery stools, are to be employed, viz.—rhubarb, magnesia, or castor-oil, with occasional doses of mercurials. It is necessary to examine daily the evacuations from the bowels in typhous fever, that the appearance of the stools may be ascertained. Bloody diarrhoea is always a most alarming symptom in fever, showing a malignant form of the disease. It depends on a loaded state of the capillaries of the mucous membrane; these vessels, partaking of the general debility, are unable to resist the congestion or afflux of blood, and consequently give way to its distending force. The congestion of the mucous membrane, and consequent hemorrhage, may take place without ulceration; but when there is ulceration the blood does not proceed from the open surface, but in the way pointed out, viz.—by capillary exudation. This symptom is best managed by suspending all irritating medicines, and administering occasional doses of superacetate of lead and opium.

When the abdomen is tympanitic, purgatives only increase the distension. Injections of carminatives give most relief, though it is only temporary. We have found an injection, consisting of equal parts of the *mistura assa-fœtida* and gruel very beneficial. As the disease proceeds, it will be necessary to allow, according to circumstances, moderate support—weak animal broths, and perhaps a little wine.

We must admit that in the treatment of fever, wine is too often administered without due consideration of the character of the disease, its stage, and the condition of the several organs. Dr. Wilson Philip observes, "that the difference of opinion which prevails on this subject, has, in a great degree, arisen from physicians having attempted to apply their rules, either for or against it, to all cases indiscriminately. Whereas it would appear that the use of wine in typhus must be almost as much regulated by circumstances as that of bloodletting in synocha. Two general observations, however, appear to me to be warranted, that more or less wine is beneficial in all severe cases of typhus; and that there are few in which large quantities are not injurious." When we see a patient labouring under symptoms of extreme debility, and find them almost uniformly relieved by a large quantity of wine, it is difficult at first view to persuade ourselves that it can be pernicious. But an attentive observer will look beyond its immediate effects, and will often see sufficient reason to doubt the safety of carrying the practice very far. He will find that the temporary excitement

he thus procures, is frequently succeeded by a greater degree of debility than that which the stimulus had removed; and if he perseveres in the practice under such circumstances, the pulse, upon the whole, will gradually become more frequent and feeble, till it ceases altogether."

Wine is seldom necessary in the early stages of fever, nor, as a general rule, at any period of the acute forms, unless, as occasionally happens, unexpected exhaustion come on, or towards the decline of the disease the powers give way. Under these circumstances, a few ounces of wine, if the skin be cool, the pulse soft, and the tongue moist, will frequently improve the condition of the patient.

In determining the propriety of administering wine in fever, the decision may in some measure be regulated by the character of the disease. We have repeatedly alluded to the difference in the type of epidemic fever. This, in our own experience, has been remarkably illustrated in the epidemic constitution of the last three years. In 1829, fever required most decided antiphlogistic treatment, as the records of the London Fever Hospital will prove. In 1830 and 1831, the symptoms assuming a low typhoid form, (which has continued up to the present time,) a more cordial or stimulant treatment became necessary. This shows that the general character of epidemic fever may at times be such as to require a stimulant plan of treatment.

Besides the indications for the administration of wine deduced from the nature of particular epidemics, there are some special symptoms which render its exhibition necessary.

1. It is sometimes observed, that when a patient in fever has been going on favourably, the pulse becomes suddenly soft and compressible, the skin cool and damp, accompanied with feeling of considerable exhaustion, and desire for wine. With these symptoms, there need be little hesitation in allowing six or eight ounces of wine in the twenty-four hours, at proper intervals.

2. When the symptoms denoting sensorial disturbance,—languor, low muttering delirium, coma, muscular tremor or subsultus, progressively increase; if, at the same time, the patient lose his strength from day to day, the pulse be soft, and the skin cool, wine may be safely prescribed.

3. When the fever assumes the petechial character, more especially if the spots be large and of a dark red or livid colour, wine is indicated.

4. In cases of sudden or unexpected collapse, which sometimes comes on without ostensible cause, though more frequently after bloodletting, protracted diarrhoea, or spontaneous hemorrhage, wine is a most effectual remedy in raising the exhausted powers of the patient.

5. Wine may be necessary to promote the convalescence in particular cases.

Another circumstance with regard to the employment of wine in fever requires to be noticed. Local inflammations not unfrequently arise in

feeble habits, or in the advanced stage of low fever, requiring general or local bloodletting. The treatment necessary to subdue the local disease lowers the general strength: the patient does not rally, but remains stationary, and perhaps loses ground and feels exhausted. In such cases, a moderate quantity of wine, provided the pulse be soft and the skin cool, is followed by excellent effects. We have often been obliged to prescribe the local and even general abstraction of blood for some sudden emergency, and in a few hours afterwards found it necessary to have recourse to the administration of wine. In such cases it should be withdrawn as soon as the powers have been restored.

Dr. Graves is of opinion that when general symptoms indicate the propriety of administering wine and opium in fever, these remedies should be prescribed, although particular symptoms apparently render the propriety of their exhibition doubtful. Dr. Graves thinks advantage may often be derived from wine and opium at an advanced period of fever, when the tongue is coated with dry brown fur, and the teeth and gums covered with sordes—when there is suffusion of the eyes—dry hot skin, heat of the scalp and flushing—a low form of delirium, with muscular tremor and subsultus—sense of weight or pain in the head, not of the acute throbbing character—and rapid, soft, or small thrilling pulse.

When the symptoms alluded to by Dr. Graves are manifest at the advanced stage of fever, we apprehend they arise from some latent local disease which has not been overcome, or has been partially renewed, and requires the adoption of local remedies suited to its intensity and the powers of the patient. We have admitted that a general stimulus, such as wine, is by no means incompatible with the local measures which are necessary to subdue low typhoid inflammation; and in offering these precautions we feel we are corroborating the opinion expressed by Dr. Graves on this subject. His remarks, indeed, are accompanied with such precautions, as shew he is aware of the necessity of guarding the inexperienced practitioner against the indiscriminate exhibition of wine and opium in fever.*

With respect to the quantity and mode of administering wine in fever, it may be remarked that it is impossible to give any general rule on this subject. The quantity must be regulated by its effects. Some of the older authors prescribed wine apparently without regard to quantity; we find on record cases of typhous fever, in which two and three bottles of madeira or port have been allowed in twenty-four hours. It would appear from these histories, that in certain forms of low fever, the system is nearly insensible to the effects of stimulants. Incredible quantities of wine have been taken by persons unaccustomed to wine without any signs of intoxication, or any other

* Dublin Journal of Medical and Chemical Science, No. 3.

perceptible effect except that of increasing the volume of the pulse, abating the delirium and muscular tremor, and restoring the heat of skin.

In the present day physicians seem less disposed to sanction extravagant doses of wine. Dr. Bateman was not inclined to exceed a pint in twenty-four hours; and enjoined, that after the object with which it is administered has been obtained, this quantity should be diminished or withdrawn, when the first symptoms of over-excitement appeared. The quantity should not be less than four, nor exceed sixteen ounces, in the twenty-four hours, unless under circumstances of sudden and extreme exhaustion, when a larger quantity may become necessary. It should always be given in small quantities, (from half-an-ounce to an ounce,) mixed with water, or some light farinaceous food, arrow-root, sago, or thin panado, the period between each dose varying according to the allowance. It is better to commence with a small quantity, and as the fever advances, or the debility increases, to augment it cautiously, and to watch its effects.

It is necessary also to bear in mind, that the quantity of wine should be regulated by the age and constitution of the individual. Young persons are not only more easily excited than those advanced in years, but in the latter the symptoms requiring the use of wine more frequently occur, and increase more rapidly.

The previous habits of the individual must also be considered; if he have been accustomed to live generously, and consequently to the use of wine and other stimulants, the allowance of wine must be greater, than in a person whose mode of living is more simple.

If we find that the pulse is quickly raised, the heat of skin increased, and the face becomes flushed, and the patient restless or incoherent, we may consider the quantity is either too large, or that the use of wine is improper. Again, if its effects soon pass off; if the patient, a short time after being stimulated, lapse into his former state of exhaustion, or seem to get weaker after each portion of wine, its longer continuance will be of little avail. On the other hand when there is a gradual and steady improvement in the symptoms, without any marked excitement after the wine has been taken; moreover if the patient relish the wine, and especially if it tranquilize him, we may confidently anticipate that it will be beneficial.

When the purposes for which wine has been given have been accomplished, it should be gradually, not suddenly, withdrawn, and the patient watched; as we have not unfrequently witnessed the train of symptoms, for which wine was first administered, renewed shortly after it has been discontinued.

The particular kind of wine is a matter of less consequence than the quality of that selected. We generally prefer the dry wines; sherry or sound Madeira, which are less likely to disagree than the red wines.

Brandy, largely diluted, is sometimes given

in preference to wine. Brandy being about double the strength of wine, when it is prescribed as a substitute, one-half the quantity stated may be ordered.

Fermented liquors are sometimes given in fever, and when a more mild stimulus than wine or brandy is wished, they are well adapted to the purpose, particularly when bottled.

Yeast has been employed in fever accompanied with putrescent symptoms, when the existence of inflammatory complications seems to contra-indicate stronger stimuli.

In some cases of extreme prostration, yeast has been given in combination with wine and other cordials. Dr. Stoker, who seems to have used it more extensively than any other physician of the present day, speaks highly of its efficacy, after a trial of its powers for upwards of thirty years, both in public and private practice. He has administered it in cases where purple extremities or gangrenous sloughing took place, accompanied with symptoms of inflammation. The result of his experience is, that barm or yeast is well suited to every stage of typhous fever in which it can be borne by the stomach. It is in general easily taken alone, or with any medicine that it may be deemed advisable to join with it; but, in the worst forms of typhous fever, when it is most needed, it not only is seldom rejected by the stomach, when any other medicine can be retained, but the patient, in such cases, often expresses a liking for it. According to this author, yeast, being moderately laxative, often supersedes the necessity of repeated doses of purgatives; but, if required, an aperient tincture may be added to it. Should, however, the bowels be purged, a few drops of tincture of opium should be added to each dose. He ascribes its efficacy to its power of correcting the morbid contents of the alimentary canal, and consequently the symptoms of putrescence, and asserts that, in his idea, petechiæ and black loaded tongue will be found more effectually remedied by it than by any other medicine. In adverting to the objection to this remedy, that it may be likely, by promoting fermentation, to increase the tendency to tympanitic distension, Dr. Stoker states, that in some of the most obstinate cases of tympanitis, enemata of yeast and assafœtida have proved the most efficacious remedies.

When yeast is administered internally, two table spoonfuls may be given in water, or with an equal quantity of camphor mixture, every three hours. If the stomach be irritable, four ounces mixed with an equal quantity of barley gruel may be administered by injection. From our personal experience of yeast, we certainly think it a remedy deserving attention in the low forms of fever.

Various other stimulants have been occasionally prescribed, alone or in conjunction with wine, in typhus. The carbonate of ammonia, combined with nitrous ether and aromatic confection, has been thought useful. We have certainly observed, that in cases in which a sudden and diffusible stimulus, less perma-

nent in its operation than wine or brandy, has been indicated, this combination has answered the purpose. We have seen it useful also as an expectorant in the symptomatic bronchitis of fever.

Another class of stimulants of a less diffusible character has been employed in the treatment of fever, viz. tonics. Of these, the vegetable tonics have been chiefly employed, more especially the cinchona or Peruvian bark, which, after sustaining more varied reputation than any other remedy in the *Materia Medica*, was at length admitted to possess superior febrifuge powers to any drug which has been discovered. When first introduced, it was prescribed chiefly in periodic fevers, but soon after acquired equal reputation in the treatment of continued fever. Its indiscriminate administration, however, without regard to symptoms or the period of the disease, has tended to diminish the confidence formerly reposed in its virtues. In the present day it is scarcely employed in the acute forms of fever, unless some particular symptoms arise, or when the fever towards its decline assumes the typhoid character.

Dr. Cullen remarks, that wherever blood-letting is proper in continued fever, bark is always prejudicial. The opinion of Dr. Bateman on this point is exceedingly strong. He states that, in the early part of his practice, agreeably to the doctrine of the times, he resorted to the decoction of cinchona on the first appearance of languor and debility. The increase of the symptoms was easily imputed to the intractable nature of the disease, or deemed the necessary result of its progress, until it became obvious, from the repeated occurrence of the fact, that the tongue, which had been, on the day before the administration of the bark, moist, and exhibiting a moist or yellowish mucous fur, was on the following morning dry or even brown; that the skin was hotter or more parched, with a flush in the cheek; that the pulse was quicker and harder; the thirst increased, and the sleep more disturbed. Dr. Bateman was so convinced that these symptoms were to be ascribed to the use of bark, notwithstanding the patient had made some progress towards recovery, that he scarcely ever prescribed it even during the stage of convalescence.

Our own experience is, that in the early stage of common epidemic fever, any preparation of bark is decidedly injurious. When the symptoms of fever have completely subsided, no tonic or stimulating remedy is needed, unless the patient be much enfeebled, and the strength slowly recovered. In such cases tonics are sometimes useful, and certainly none of the vegetable class is more powerful than bark in the form of the quinine. But we hold its exhibition in the early stages of fever under any circumstances improper, as tending, by its stimulant powers, to keep up or increase the febrile action in the system; and when there is local complication, it is

evidently so pernicious that scarcely any practitioner can be so ignorant of the common principles on which the treatment of fever should be conducted, as to think for one moment of its administration under such circumstances.

When the fever is of the typhoid form, and the symptoms, as the disease advances, denote failure of the powers, more particularly if the pulse become soft and compressible, the skin covered with petechiæ, and there be tendency to gangrene, bark, in addition to nourishment, wine, and other stimulants, may be given with the best effects. The sulphate of quinine combined with sulphuric acid is the best mode of administration.

Infusions of some of the other vegetable tonics, serpentaria, cascarilla, calumba, &c. have been proposed as substitutes for the cinchona. As stimulants they are less powerful, and when a light vegetable tonic is desirable, the infusion of any of these may be advantageously prescribed, with or without the addition of an aperient, according to the state of the bowels.

Opium and other narcotic substances have been administered in fever with two indications: 1st, as stimulants when the powers are sinking; 2d, to tranquilize the nervous system, and to procure sleep. The use of opium, as a general stimulant in fever, has been abandoned, wine being proved more safe and durable in its effects.

From the stimulant effects of opium it is injurious in the acute forms of fever, more especially when local inflammation exists. In the early stages it is inadmissible, and indeed much discrimination is required to detect the symptoms which indicate its administration. The delirium and wakefulness of subacute inflammation of the brain is best overcome by topical bleeding, and the application of cold lotions to the scalp; and when the morbid condition of the brain on which the want of sleep depends is removed, the patient generally enjoys intervals of refreshing sleep. In other cases, a state of distressing restlessness with obstinate wakefulness remains, exhausting the patient, and adding greatly to the sufferings. If, with these symptoms, the pulse though soft be rapid, the skin cool, the face pale, the tongue moist, and there be no suffusion of the eyes, opium often acts like a charm. If, however, its exhibition be followed by increase of delirium, thirst, and heat of skin, or if the tongue become dry, and the bowels confined, it should be discontinued.

We do not however think, that in every case the opium should be withheld, if the tongue be dry and even furred, as we have often seen this remedy decidedly beneficial when the tongue was in this state, if the other symptoms indicated its exhibition.

Dr. Stokes has proposed the administration of large doses of opium in peritonitis from intestinal perforation. In these cases the usual antiphlogistic treatment is inadmissible, from

the sinking of the vital powers, which rapidly supervenes. When effusion of the alimentary contents through the perforation takes place, the fatal issue is inevitable. In some few instances, nature, as we have already observed, makes an attempt to repair this lesion; adhesion of the bowel, at the point of perforation, to some portion of the intestine, or adjacent viscus, is sometimes formed, and thus effusion into the abdomen is prevented. When this occurs, the peritonitis is limited in extent; and to these cases the administration of opium is well adapted. Dr. Stokes states, that in the treatment, the first indication is to support the strength of the patient, as far as this can be done without injury; the second, to prevent the further effusion in the peritoneal cavity, by endeavouring to induce organization and adhesions of the effused lymph. This latter indication is best fulfilled by time, and by attempting to diminish as far as possible the peristaltic motion of the intestines. For this purpose opium is to be given in repeated doses. Solid opium, in grain doses, or the black drop in doses of five drops, is recommended to be given every second hour till the symptoms of abdominal inflammation abate, after which the dose is to be given at more distant intervals. In one case, though unsuccessful, this treatment afforded decided relief. Sixty drops of the black drop were given in the twenty-four hours. In another, in which recovery took place, one hundred and five grains of solid opium (exclusive of anodyne injections) were administered without the patient experiencing any of the usual effects of this remedy when exhibited in large doses.*

We think this suggestion of Dr. Stokes valuable, even in those cases in which the fatal issue is inevitable, in consequence of rapid and extensive peritonitis from effusion of the contents of the bowels into the abdominal cavity; it is the best palliative mode of treatment; and in partial peritonitis, when nature attempts the reparative process, it gives the patient the best chance of recovery.

The form in which opium is prescribed is a matter of less moment than a correct knowledge of the circumstances which indicate or forbid its employment. We have found a full dose of solid opium, (one or two grains,) answer every purpose. But we certainly prefer the acetate or the muriate of morphia, in doses of half a grain dissolved in distilled water. Some physicians prefer minute doses of opium at certain intervals, so as to keep the nervous system under its influence. We have tried this mode, but deem it less efficacious than a full dose administered at once.

The other narcotics—hyoscyamus—camphor—cicuta, are very inferior in efficacy to opium. They may, however, sometimes be advantageously combined. The extract of poppy, in doses of eight or ten grains, is often a pleasant

opiate. We have also found fifteen or twenty grains of camphor, combined with a quarter of a grain of acetate of morphia, an excellent formula.

The practice of applying blisters in fever was adopted by the older authors to produce a stimulating effect in the advanced or sinking stage of the disease. There can be little question of the effect of rubefacients and vesicants in exciting the system in phlogistic states, but we apprehend their efficacy in rousing the vital powers when the nervous system is oppressed is very questionable, and that, consequently, their value as general stimulants is doubtful.

Blisters and rubefacients are, however, applications of great utility in the local inflammations which occur in fever. They may be employed with this view as auxiliaries to other antiphlogistic measures; or in cases when the vital powers are so low that even local blood-letting cannot be adopted, they may be applied at once, as near the inflamed organ as possible, with the best effects.

Blisters are not, however, to be prescribed without discrimination, as injurious consequences often arise from their injudicious application.

In the acute forms of fever with local inflammation, they should never be employed till more active measures have been adopted. When the capillary congestion has been reduced by local or, if necessary, general blood-letting, should pain or any other symptom indicate that the local affection has not been wholly subdued, the application of a blister to the neighbourhood of the inflamed organ will often remove the disease. If it be applied without this precaution, it will invariably increase the very action it was intended to subdue. Even with the circumspection recommended, we have repeatedly seen the local disease renewed by the stimulus of a blister. It is, therefore, by no means always safe to adopt counter-irritation in the more acute forms of fever, notwithstanding the too common practice of at once applying blisters on the first appearance of local inflammation, without the precaution of previous depletion.

In the inflammations which arise in typhoid fevers, blisters are excellent local remedies, and we certainly think they are more useful in this than in any other form of the disease. In the low kind of cerebral inflammation, with tendency to coma, after leeching, the application of a blister to the occiput, with a cold lotion to the anterior portion of the scalp, is followed by the best effects. Some physicians think that in these cases a sinapism or a blister to the lower extremities is of great service, and explain the efficacy of these applications on the principle of revulsion. We have certainly seen excellent effects result from them.

Cases are recorded in which boiling water has been applied to the extremities with the object of producing sudden and powerful revulsion in severe cerebral affection in

* Dublin Journal of Medical and Chemical Science, May 1832.

fever. In extreme cases this may be adopted, but from the severity of the measure it can never be generally pursued.

In the secondary pulmonary affections which frequently arise during fever, local bleeding by leeches or cupping, and afterwards blistering the chest, is the best mode of treatment. When the symptoms have been overlooked on their first appearance, or when the strength will not admit of any form of bloodletting, counter-irritation is the only local treatment that can be employed.

In the chronic stage of the intestinal disease to which we have so often adverted, blistering the abdomen is decidedly beneficial. This practice is however by no means applicable to the acute stage of gastro-enteritis; indeed the application of a stimulus so powerful must inevitably increase the inflammatory action.

It is necessary to bear in mind, that in the typhoid forms of fever blisters do not always heal kindly. The blistered surface, assuming an unhealthy aspect, gradually degenerates into a troublesome species of ulceration, which keeps up feverish irritation in the system. When blisters either do not rise at all, or become troublesome ulcers, it is always an indication of a dangerous fever. We have certainly seen the fatal issue hastened by the effects of a blister.

With regard to the milder forms of counter-irritation, we have seen, in slight cases of local disease, sinapisms very useful. The epigastric tenderness with irritation of the stomach which occasionally appears in the early stage of fever, is often at once removed by the application of a mustard poultice to the epigastrium.

In the gastro-enteritis of fever, cloths soaked in oil of turpentine, and kept constantly on the abdomen, have been applied in order to produce counter-irritation and revulsion. When circumstances prevent the use of blisters, this application may be substituted, though it is much less powerful than either mustard or cantharides.

In all cases of fever, more especially with cerebral affection, it is exceedingly important to examine the state of the bladder. When there is retention of urine, the catheter should be employed. The practitioner requires also to be vigilant when the urine is passed involuntarily; in these instances, from the paralysed state of the muscles concerned in the expulsion of urine, the bladder becomes distended, its muscular coat ceases to contract on its contents, and from a small quantity being occasionally voided involuntarily, the medical attendant is apt to be satisfied with the report of the nurse, that there is no accumulation in the bladder. The tympanic enlargement of the abdomen may prevent the distended bladder being felt, so that in these cases the catheter should be occasionally introduced to ascertain the state of this organ.

We have already alluded to the revival of

the theory, that a vitiated state of the blood is the cause of some forms of fever.

A mode of treatment founded on this view has been proposed by Dr. Stevens, on the supposition, that in fever, but more particularly in the malignant forms, the vitality of the blood is lessened, and the quantity of its saline ingredients, especially the muriate of soda, ultimately diminished. He considers that the natural saline impregnation of the blood is the cause of its red colour, and that the diminution of its salts is the reason of its black and vapid condition in the last stage of fever.

On this theory Dr. Stevens recommends, after reducing excitement at the commencement by bleeding, purgatives, and other antiphlogistic measures to prevent serious injury to any of the organs, the administration of a sufficient quantity of non-purgative salts, with the object of restoring to the blood the proportion of saline ingredients it has lost. After this has been done, in place of lessening the quantity, it is necessary to remedy the diseased quality of the blood, by correcting acidity, if it be present, by alkaline carbonates, and afterwards throwing into the circulation an extra supply of those stronger salts which act directly on the blood, reddening its colour, correcting its diseased properties, and adding to its power of stimulating the heart.

For a considerable time after Dr. Stevens commenced the saline treatment, he used (except when there were symptoms of acidity in the stomach) a strong solution of the muriate of soda with nitrate of potash; but he has subsequently preferred another combination, consisting of twenty grains of the muriate of soda, thirty grains of the carbonate of soda, and eight grains of the chlorate of potash. This saline powder, dissolved in water, is to be given every two or three hours (more or less frequently, according to circumstances) in the middle and last stages of fever, and to be gradually left off as the convalescence advances. These salts enter the circulation and do not irritate the stomach and bowels; and according to Dr. Stevens, when given before the stomach has ceased to perform its functions, the bad symptoms soon disappear. A solution of the muriate of soda (two table-spoonfuls to a pint and a half of tepid water or thin gruel) may also be occasionally thrown into the bowels. The strength is at the same time to be supported by strong clear beef-tea.

In extreme cases, or when the practitioner is not called in till the very last stage of fever, Dr. Stevens thinks life may be occasionally saved by injecting a saline solution into the veins.

We have lately adopted this saline treatment in some cases of typhous fever. Our individual experience, however, has been so limited that we are scarcely competent to pronounce an opinion on its value. If the premises advanced by Dr. Stevens be correct, (and we have already expressed our belief that a certain class of fevers do originate in a mor-

bid state of the blood,) the saline treatment he has had the merit of proposing, appears the most likely to correct the vitiated condition of the blood. It should also be observed that Dr. Stevens does not overlook the changes in the solids: when these exist, they are to be treated by active measures, and the saline treatment afterwards adopted.

It would appear, also, that the nitrate of potash, which has been long used as a cooling remedy in fever, may act beneficially on another principle—that of altering the diseased properties of the blood.

It is well known that this salt, when mixed with dark blood out of the body, possesses the power of instantly changing the colour to a bright red; and from its having been used with the most beneficial effects in cases of scurvy, it is reasonable to suppose that it will effect a beneficial change in the blood in malignant fever.

It is proper to add a few observations on the diet of fever patients. The complete disrelish of every kind of food during fever points out the necessity of abstinence; and in cases where, from mistaken views of the supposed advantage of nourishment, food of an improper description is given, the stomach frequently rejects it.

For the first few days the patient generally refuses any kind of food. While the febrile symptoms continue, farinaceous substances, such as the different kinds of gruels—arrow-root, sago, rice, prepared barley, and oatmeal, acidulated with lemon juice, form the most suitable nourishment. A cup of any of these gruels may be given at intervals, and if the patient retain the relish for it, a cup of weak black tea may also be allowed occasionally. We have often observed that thirst is more effectually allayed by weak tea than by any other beverage. Sometimes ripe fruits are grateful, and therefore may be allowed in great moderation, unless there be symptoms of gastric disorder, or such fruits disagree.

When the symptoms of fever abate, more particularly when the tongue begins to clean, and the appetite to improve, a portion of stale bread or water biscuit should constitute the only additional nourishment, till the fever has entirely disappeared. The weak animal broths may then be substituted for the farinaceous food; and of these the quantity should at first be moderate, that the stomach may not be oppressed.

In the course of three or four days a little solid animal food, plainly dressed, may be allowed, unless there be special circumstances to forbid it. The quantity of animal food should not exceed three ounces at first, and mutton, from its being more easily digested, should be preferred. If the patient feel any uneasiness after it has been taken, it must of course be omitted, and beef-tea or mutton-broth again for a time substituted.

When the patient has been much reduced, more particularly if there be a natural delicacy of habit, one or two glasses of sherry wine,

mixed with water, may be taken during the day; but, in general, in convalescence from common epidemic fever, wine or fermented liquors are not required, unless the powers are feeble, or the patient has been accustomed to their daily use. As a general rule, nourishment may be given more early in typhus than in the acute forms of fever.

Of convalescence.—In no form of acute disease is the management of convalescence of more importance than in continued fever; and few persons among the educated—none among the ignorant—can conceive the precision that is required in this particular.

It is too commonly imagined that, when the fever has disappeared, all danger is at an end; that nothing remains to be done but to recruit the strength by nourishing food and imprudent exertion. If the feeble state of every organ in the body, but more especially of those which may have been more seriously affected, and the slow and gradual manner in which they recover their natural vigour, were considered, few would be so careless of their safety as to hazard a relapse which might be fatal.

It is the duty of medical attendants to place these circumstances strongly before the patient, and to impress on the mind the paramount necessity of refraining from every thing that is likely to produce excitement.

In almost every case the practitioner has to contend against the prevailing notion, that the strength can only be restored by nourishment, and even wine. The inherent restorative powers of the system, and the greater safety of leaving nature slowly to effect her own purposes, than to hazard a renewal of the febrile action, or to rekindle local inflammation by acts of imprudence, should be pointed out. When the symptoms have been severe, and consequently the treatment active, more especially when large losses of blood have been sustained, the greater is the danger of relapse. In some instances again, the local inflammation which may have arisen has not been wholly extinguished, there is a lurking indisposition—a tedious recovery, as it is termed. Such cases, it should be remembered, only require the excitement resulting from indiscretion in diet or prolonged exertion, to reproduce the local inflammation.

In the management of convalescence, therefore, the patient should not be permitted to sit out of bed till the strength be considerably advanced. It is better that restriction should be imposed a little too long, than that any risk of relapse should be run.

The next point is of still greater consequence—the proper regulation of the diet. This has been already minutely discussed, as well as the order in which the food should be changed. We may, however, remark that, in our experience, by far the greater number of cases of relapse take place from indiscretion in diet. It should also be strongly impressed on the convalescent, that it is as necessary to guard against the quantity as the quality of food, particularly when there has

been gastric irritation in the progress of the fever. The stomach may be able to digest and assimilate a limited proportion of food; but the indulgence of an extra ounce or two may induce oppression, and a renewal of the fever. This organ in convalescence partakes of the external or muscular debility, and the convalescent may as well expect to be able to carry a heavy load on his shoulders, as to digest an undue quantity of food, even of a suitable kind. Indeed, every practitioner of experience knows, that with the best precautions, the return to solid animal food is hazardous.

Besides avoiding every source of general excitement, it is necessary to impose restrictions according as the several organs may have been affected. Thus, when the symptoms in the brain have been severe, undue mental effort should at first be abstained from as much as possible. When the lungs have been inflamed, every circumstance likely to produce recurrence of the pulmonary disease must be avoided; and similar precautions, but more especially with regard to diet, are necessary when the gastric organs have been implicated.

Exposure to cold in the winter and spring must be most attentively guarded against. Many persons who have struggled through a most dangerous fever, have, from imprudent exposure to cold, been seized with intense inflammation in some organ, which has rapidly destroyed life: hence the necessity of suitable clothing, and regulating the temperature of the chamber, during the period of convalescence from fever.

(*A. Tweedie.*)

FEVER, EPIDEMIC GASTRIC. The arrangement of febrile diseases by Sydenham was founded on the observation that such diseases, revolving in cycles, present characters which are probably owing to certain changes in the constitution of the inhabitants of a country, whether produced by the nature of seasons, or of exhalations from the ground, or of food, or by moral causes, or by a combination of all these important influences. These influences, although they act in a manner hitherto unexplained, give a stamp to epidemics; and not only do they affect the epidemic, the great current disease, but also those concurrent diseases which specifically differ from it, while they retain towards it a certain generic affinity. Hence it is that we have considered a passage in Sydenham, which has often been quoted, as the best clue to guide the physician who means to explore the labyrinth of febrile diseases; a passage which, had it stood as a solitary fragment, would have vindicated the claim of Sydenham to be considered a master in the science which he cultivated. So admirable is it, that in letters of gold it ought to be inscribed in the consulting-room of every fever hospital in the empire, to guard physicians against the evils which flow from adopting the exclusive views of systematic writers, or fol-

lowing the dangerous routine of practice to which they often lead. "This, however, I am convinced of from numerous careful observations, that the same method which cures in the middle of the year may possibly prove destructive at the conclusion of it; and when I had once happily fallen upon a genuine method of treating any species of fever suitably to its nature, I always proved successful (proper regard being had to the constitution, age, and other particular circumstances of the patient,) till that species became extinct, and a new one arose, when I was again doubtful how to proceed, and notwithstanding the utmost caution could scarce ever preserve my first patients from danger till I had thoroughly investigated the nature of the distemper, and then I proceeded in a direct and safer way to the cure."

Three times in the course of thirty years, gastric fever, or rather gastro-enteric fever, has prevailed under our observation; first, about the latter end of the last century or beginning of the present, in 1799 or 1800; again in 1816, and a third time in 1826-27. With respect to the duration of its first visit, we cannot speak with certainty; in 1816 it did not continue for many months; but the epidemic which arose in 1826-27 is not yet over: and thus it has afforded to the medical observer an opportunity of deliberately enquiring into its character and tendencies. It is chiefly from this epidemic that the following history of the disease is drawn up.

The following may be considered as the most remarkable features of gastric fever. General uneasiness and restlessness, or, as the patient is apt to describe his condition, "complete wretchedness;" a most unpleasant state of the mouth—a taste which, like the general unhappiness, cannot be described, but is intolerable; heat, often tenderness, or even pain in the epigastrium, and redness of the fauces, which often ends in an aphthous state of that surface.

This species of fever often begins in an unusual manner, and also follows an unusual course. Many patients have fallen under our notice who had been indisposed for a considerable length of time before the formal invasion of the disease; from one to five weeks: they had complained of occasional headache, languor, and irregularity of the bowels; their tongue being white, their stomach flatulent, the eructations fetid; yet were they not without appetite, nor were they by disease incapacitated for business, nor unable to take exercise, although it soon produced exhaustion. Seldom can the day upon which the fever commenced be ascertained, and generally there is no regular crisis; in short, both the attack and the recession of the disease are almost insensible, the former especially often occurring without the consciousness of the patient or the observation of his friends.

Many patients also continue for a long time unconscious of their true state, and are astounded when they learn that they are under the influence of continued fever. During the

years 1828 and 1829 the writer has often found in his study, waiting his return home, a patient who was under an impression that he had contracted some slight disorder of the stomach or biliary organs, but who in reality laboured under gastric fever, and had done so for many days, or perhaps weeks. In these individuals the tongue was generally white, while there was a blush of inflammation in the fauces; they complained of an unpleasant taste, and a degree of thirst: their pulse was from fifteen to thirty beats quicker than natural, and there existed some heat of skin. They admitted that they felt uneasiness in the abdomen, and they complained of restless nights, during which their thoughts were often confused and incoherent, and yet their muscular strength was not much impaired; and hence it was not surprising that they should have expressed no small astonishment when the nature of their illness, with the necessity of confinement to the house, was explained to them. Some were affected with headach, which completely intermitted in the morning, and was severe towards night; and this had been the case for many days before a rigor, which often introduced a state of aggravated suffering, took place. An apothecary of discrimination, explaining the case of a patient who for several weeks had been ill, added that he had been "affected with one of those walking fevers," by which he meant that he had walked about performing his business, while affected with gastric fever.

The tongue in some cases is not loaded; nay, on a cursory examination, one would often be tempted to say that the tongue was quite natural in appearance; for, although the papillæ were elongated, and the intervals between them rather glassy, it was not white, and there was scarcely any coating upon it. But in other cases the tongue is covered with a thick cream-coloured secretion, like size laid on with a brush, and so also are the fauces. This, which resembles the thrush of infants, is one of the most characteristic symptoms of the disease. We once conceived that the appearance in the fauces was caused by exfoliation of the epidermis of the mucous coat, but it is not so; for when the crust is spontaneously detached or removed by a borax gargle, or rubbed off by means of lint at the end of a probe, the surface beneath, although vascular, is not excoriated. Sometimes the coating on the tongue is dry and brown, and sometimes the centre of the tongue appears as if covered with silver paper, the edges being moist. In the advanced stage of the severe cases it is often rough, dry, shrivelled; sometimes it seems as if covered with varnish, and cleft, especially by a central line, these ragades being deep and painful, and leaving permanent furrows.

There is very generally an affection of the stomach, which varies much in severity; so slight is it in some cases that the appetite for food is scarcely impaired, while in others symptoms of intense gastritis are observed:

nor is there any want of intermediate cases of every degree. Generally accompanying the very disagreeable taste already alluded to, there exists nausea and a loose state of the bowels; the stools being watery, of a light brownish yellow colour, and of a pungent odour, not unlike the odour which sometimes exhales from the discharges which take place during dysentery, or like the smell of the steam which arises when *corned* meat tending to putrescency is boiling: these stools are not unfrequently mixed with mucus. Sometimes large discharges of blood from the intestines take place, which generally are followed by a mitigation of all the symptoms of the disease, the blood being generally fetid and dark, almost as dark and much more fetid than the discharges in *melæna*. After such discharges, however, the patient will often sink and die. The urine is mostly high coloured: great thirst usually exists. In a protracted case of gastric fever, a patient attended by the writer drank fifty dozens of soda water. Considerable heat of surface exists, especially towards evening. The pulse varies; its most usual property is hardness: often it will for a great many weeks exceed 120, while in many cases it never exceeds 80: even then the other symptoms are alarming; as, for instance, when the stools and urine are passed involuntarily. Sometimes the disease ends fatally without any tenderness, pain, or inflation of the abdomen; but frequently, as the disease advances, the intestines become distended with flatus, and tympany occurs, which in this disease is a more alarming symptom than it is in most other febrile disorders. And sometimes also in its advanced stages, this variety of fever is attended with stupor, low muttering delirium, hiccup, subsultus tendinum, floccitation: in short, with all those symptoms, bootless to enumerate, which attend typhoid fevers. Moreover the fever is often attended with bronchitis, which gains the ascendancy over the proper symptoms of the disease, and sometimes appears to be the cause of the patient's death.

There is great variety in the state of suffering. Some individuals appear to be scarcely conscious of illness, while very many are miserably wretched and impatient, passing their nights in a state of unhappy and discontented delirium, and declaring themselves ineffably wretched, and in the early period of the disorder are liable to acute headach, which closely resembles intermittent hemicrania: in truth, the disease is often productive of a degree of suffering which is not often exceeded.

There is often a remission of the symptoms after midnight, which continues until morning, when the heat becomes inconsiderable and the extremities cold; then an exacerbation takes place, and the febrile symptoms increase as the day advances: in the evening they are most severe. There is often an aggravation of suffering on every alternate day, the disease being as it were a tertian remittent: the type is not very distinctly marked, yet it is sufficient to lead the attendant to ob-

serve that a good day and a bad day regularly succeed each other.

In females symptoms of hysteria are often manifest during gastric fever, such as attacks of faintness, palpitation, sobbing, pale urine being passed in profusion.

We would remark with respect to these symptoms, when they are discovered in this or any species of continued fever, that they enhance the perils to which the patient is exposed; whereas when hysteria is an adjunct to any other disease, we are led to subtract from the estimate which we might otherwise have formed of the amount of the danger.

In successive seasons we may remark a considerable variety in the symptoms of the fever; for example, the state of the surface of the body varies considerably. For two or three years, from 1827 to 1829, there was an entire absence of eruption of the skin, with the exception of the white miliary rash, which in many patients was to be found in the hollow above and below the clavicle, and in the sides of the thorax over the false ribs. This rash, probably, belongs to the gastric more than to any other species of fever; we do not include rheumatic fever, whether common or puerperal, which has its own miliary rash, but limit this observation to epidemic fevers. During the first quarter of the present century, the miliary eruption was very rare; with a slight exception during all that time, the miliary rash was nearly absent. During the last five, but more especially during the last three years, the miliary vesicle has been very common. During the winter of 1830, if the red miliary rash be papulæ, with minute suppurating heads, that eruption was observed; about the same time petechial eruptions re-appeared (after an absence of several years) as symptomatic of the fever under consideration: the petechiæ, however, were rather clear, diffused maculæ than the florid or purple stigmata, to which, perhaps, the term ought to be limited.

No precise duration can be assigned to gastric fever. We have seen it observe a septenary period, although obscurely. Sometimes it extends not beyond one week; we have known it exist for three months, but its course is sometimes even much more extended. It is exceedingly under the influence of regimen. When pursuing its course silently and unobserved, it may be roused so as to be attended with both suffering and great danger by stimulating ingesta, fatigue, or anxiety. In like manner, also, relapses are very often produced.

There is much obscurity with respect to the infectiousness of gastric fever. To us it has appeared that this species of fever is sometimes infectious and sometimes not. For several years the fever appeared in families only in solitary instances, or if more than one were affected, they were seized nearly at the same time; but it did not extend so as to lead us to think that it propagated itself. We were unable to assign the cause of the disease further than that we observed, in several houses in which our

patients lay, that fetor which is discoverable when a sewer is choked, and in some instances upon inquiry it was found that the sewer leading from the house had been improperly constructed and neglected. In one patient the disease commenced in the middle of the Atlantic Ocean, and a fortnight before he reached land. But it would not be safe to affirm that in the winter of 1830 the fever did not possess an infectious property; in virtue of which, and exclusive of every endemic influence, it spread through families. Thus the family of a gentleman of fortune, part of them from England and part from Ireland, met in the latter end of autumn in a large mansion in the most airy part of the city of Dublin. One of the young people from the country of Cork, who had been indisposed for several weeks, was obliged to betake himself to bed shortly after his arrival; then one of his sisters fell ill, then a second; then a footman who had attended his young master; then a housemaid; then a third sister; then a brother; then a fourth sister; and lastly a fifth and sixth sister, both of whom had come from England during the confinement of the first patient. These individuals were sickening in succession during a period of upwards of three months, and the cases differed only in severity. One of the patients, the footman, died, and the eldest of the young ladies did not require to go to bed; yet were the symptoms of the same kind in all these cases. Many instances of the extension of this fever in families occurred within our observation during the winter of 1830 and 1831, which, although not so conclusive as that just related, induced us to think that gastric fever is sometimes an infectious disease.

This disease depends upon an excited state of the stomach and intestines, which would seem to have been inflamed; but this state is by no means identical with common inflammation. After death, the mucous membrane of the stomach is found thickened, unusually vascular, in many places of a bright or deep red colour, sometimes with blood effused underneath; the vascularity of this membrane is often rather that which would indicate congestion in the veins than in the arteries. There are, however, cases in which ulceration and even perforation of all the coats of the intestines have taken place.

The following case and dissection will illustrate many of the foregoing observations:—W. V., who had been ill for many days, was visited by his medical attendant for the first time on the 13th of November, 1829. He had a sunken expression, his face was covered with perspiration, pulse 120, and weak. He complained of pain in the back of the neck and head, which was removed by some mild opening medicine, and never returned. For the next four weeks he was confined to the house, and engaged in business, which harassed him much. He had all the time the same expression of countenance, a strong tendency to perspiration, particularly after the smallest

dose of antimonial or Dover's powder. His bowels were at all times very free, having three or four evacuations every day without medicine; his sleep was without refreshment; his appetite at first unimpaired; his tongue morbidly clean; his pulse quick and tolerably firm; he chiefly complained of debility, and never of the smallest pain in any part of the body. During the last ten days of his life he was confined to bed. About the 12th of December he became slightly delirious, but still was sufficiently collected to know every one about him, and occasionally to speak on business. He was sunk in strength, his pulse was quick and weak, tongue dry and chappy, great thirst; two or three times he vomited a small quantity of fluid the colour of verdigris. On the morning of the 14th he had a profuse discharge of blood per anum, when he became nearly exhausted; his face was covered with a clammy sweat, extremities cold, and pulse at the wrist imperceptible. Involuntary discharges of clotted blood, slight tenderness of the abdomen—death.

Throughout the attack, medicine appeared to exert too powerful an influence. A few grains of rhubarb produced numerous fluid stools; a few grains of Dover's powder occasioned profuse perspiration. On one occasion he got a little quinine, which disagreed and was discontinued.

Dissection twenty-four hours after death.—On opening the abdomen a great quantity of the same kind of fluid which he had passed per anum flowed out and ran about the floor. The intestines were largely distended with flatus of insufferable fetor. The liver was of a dark green colour; the gall-bladder greatly distended with bile. The lesser omentum was black and gangrenous; its structure giving way under the finger. The stomach of the usual size. On opening it, the mucous membrane presented a singular appearance; it was thickly coated with lymph, which appeared in masses resembling small glands, of the size of half a split pea: towards the cardiac orifice and at the greater extremity of the stomach, the surface was very dark-coloured, almost black, and had much the appearance of gangrene. There was a large ulcer, of more than the size of a shilling, which penetrated through the substance of the stomach; its edges were thick, elevated, and rough on the internal side, more smooth on the peritoneal side, but still thickened; the viscus appeared more healthy towards the pylorus, which was greatly contracted in size, and scarcely permitted the passage of the little finger. Along the tract of the lesser intestines very vascular patches were observable on the peritoneal surface. A portion of the intestine close to the termination of the ileum, about eight inches in length, was removed and slit open. On the mucous surface there were seven or eight ulcers, elevated at the edges and hard. One of them was sloughy, and penetrated through all the coats of the intestine into the cavity of the peritoneum; the surface was smeared with the same kind of bloody

fluid already mentioned. The great omentum was thickened, of a dark mahogany colour, evidently in a state of inflammation approaching to gangrene.

There is one consideration which vindicates the publication of this case of gastric fever, namely, that it illustrates an important peculiarity in the disease. Extensive mischief often takes place in the abdomen without there being any symptom, such as great heat, tenderness, pain, or tumefaction, till within a very short time before death, to indicate that a disorganizing process is going forward.

Treatment.—The morbid action of the mucous coat of the intestines does not terminate as common inflammation does, but produces excessive secretion; yet this increase of secretion does not, at least in the first instance, relieve the irritation of the surface from which it proceeds: frequent copious watery stools are often productive of no relief, and yet they may not safely be checked—we may moderate, but we must not suppress these discharges. If these discharges do not reduce the strength of the patient, if they occur not more than three or four times in the day, the less we do the better. We may prescribe mild glysters, light and nourishing drinks in small quantities, barley or rice water with a little isinglass, or gum-water with syrup of capillaire; we may moderate the heat of the surface by tepid affusion or sponging, equalize the circulation by fomenting the legs, and applying cold water and vinegar to the head: while we ensure ventilation, we must not reduce the temperature of the apartment below fifty degrees; and, finally, we are not to employ internal medicines, whether purgative or astringent, without a very clear indication. In truth there are many cases in which nothing can be done by the physician, but to ascertain, at each successive visit, that there is no aggravation of any of the symptoms of the disease. And yet it is of great importance to recollect that there is no disease in which he is in greater danger of losing the confidence of his patients, unless he explains the probable duration of the fever, and the danger which often suddenly arises even in the mildest cases. In reference to the great proportion of cases in which the practitioner is not required to interfere, the writer cannot help alluding to a physician, originally a man of very energetic measures in the treatment of fever, who, it is said, became, within the last two or three years of his life, remarkable for his "milk and water practice." Now if the physician alluded to was treating the disease under consideration, as there is reason to believe he was, he evinced his skill; for had he in most cases employed either depletory means or stimulants, fewer of his patients probably would have recovered than actually did. Long and watchful practice confers no greater boon than in enabling a physician to be inactive without loss of character, or the danger of being supplanted by those who think it necessary to practice, not only for the benefit of their patients, but on the cre-

dulity of the attendants or friends of their patients.

If the discharges exhale a pungent or fetid odour, we may give charcoal, recently and finely levigated, in doses of fifteen or twenty grains. If the discharges are very frequent or excessive in quantity, they may be checked by means of enemata of laudanum and mucilage. The enema, for an adult, consisting of fifteen or twenty drops of laudanum in two ounces of mucilage of gum-arabic or starch, administered immediately after a stool, and kept from passing off by means of a towel pressed against the anus, will often check the discharge for many hours. In this state of the bowels a quarter or one-fifth of a grain of the watery extract of opium, with two or three grains of rhubarb every fourth or sixth hour, will often be found useful. If, on the contrary, the bowels have ceased to act, and the patient become heavy and oppressed, a mild aperient glyster, gruel with soft sugar, and a small quantity of Glauber's salt, or an aperient draught of the mildest kind, by resuscitating secretion will relieve the whole system from oppression. It is very remarkable in this disease how small a dose of any medicine, whether aperient or astringent, will produce a sensible effect; and hence it would appear highly important, as our object is often merely to avoid extremes, not to give medicines in an overdose.

When the bowels are not in a state to require either purgative or astringent medicines, (and this will very often be the case,) the mineral acids may be given generally with great benefit. The writer has in general preferred the nitro-muriatic acid: two drops of the nitric, and four of the muriatic, in a large wine-glassful of water, may be given every second or third hour; in general this draught will prove not only beneficial, but very agreeable to the palate and feelings of the patient, tending to quench thirst, remove the disagreeable taste, and allay fever and irritability.

As the disease advances, very weak chicken-broth or beef-tea will be useful, and the patient will sometimes require wine, but it must be given very sparingly; an ounce, or even half-an-ounce of claret diluted, and given every third or fourth hour, generally will prove a sufficient quantity, or a tablespoonful of sherry in a little soda water, or one or two table-spoonfuls of Hock or Barsac in Seltzer water. No point of practice more requires to be well considered than the exhibition of wine in this species of fever. There is a species of debility produced by an excited state of the mucous membrane of the stomach which wine will not relieve, but which will yield to topical bleeding; this often attends the earlier part of the disease, when indeed it will very seldom be necessary to give wine; in its more advanced stages, when much exhaustion is complained of, when the pulse is characterized by smallness, irregularity, or inequality, and when the circulation in the extremities is languid, we must give wine, but very cautiously; and we must be prompt in withdrawing the allowance of wine upon any gene-

ral reaction or local determination taking place. There are two principal terminations of fever, one by a change in the distribution of the fluids, the other by those vessels which have been in a state of congestion returning to a more natural condition. In both of these there is increased or altered secretion; in the former, from a part of the system distant from that principally affected; in the latter, often from the affected surface. In catarrhal, gastric, and enteric fevers the disease very generally terminates by secretion from the affected mucous membrane, and the resolution of the disease is almost insensible. Now, as a general rule, it will be found that wine is little needful in this class of fevers; indeed in most of the cases it may altogether be dispensed with.

In gastric fever with a dry tongue and tympanic abdomen, chicken-broth, or Seltzer water with milk, will be preferable to wine; at all events wine ought not to be given at the first appearance of these symptoms. The tympany may often be removed by means of spirit of turpentine, but will generally soon return; and turpentine, at each successive dose, will be found of less and less efficacy. Emollient enemata, terebinthinate fomentations, blisters to the abdomen, nitre largely diluted, from 3℥ to 3i to sixteen or twenty ounces of almond or arabic emulsion, taken in the course of the day, with small doses of rhubarb, was the treatment most applicable to this state. When the tension is removed, wine is sometimes needful, or a tea-spoonful of brandy in a small cupful of warm milk or gruel every three or four hours, may be given with advantage.

When the patient is restless and uneasy, a change of bed will often prove most tranquilizing. When the circumstances of the individual will permit, there ought always to be two beds in the chamber. There ought also to be an easy chair, in which the patient, when able to leave his bed, may sit, half-recumbent, during part of the day; in which position with his legs on a footstool, fomentations may conveniently be applied to the whole of the lower extremities.

Is bleeding requisite in this form of fever? Very often it is. When in a young and healthy patient there is early in the disease much vascular reaction, nothing will prove so useful as the loss of eight or ten ounces of blood; and when tenderness and heat of the abdomen is discovered at any period of the disease, from eight to eighteen leeches may be applied. So also ought we to proceed when there is excessive irritability of the stomach, with unquenchable thirst. But we are not to bleed as if the disease were to be extinguished by bleeding: this it cannot be—we may expect to moderate the severity of the symptoms by bleeding, to restore secretion if it be suspended, to moderate secretion if it be excessive; but as the disease generally has a long course to run, and as the issue will depend upon the strength of the patient being husbanded, if there is nothing in the intestinal tube which indicates inflammatory irritation, our part will be, not to bleed,

but to allow the disease silently to wear itself out, unless in those cases in which inflammation is kindled up in the progress of the fever in other organs, in the lungs for instance, which was often the case while an influenza prevailed in the winter of 1829. In one of many such cases the writer directed 60 ounces of blood to be taken within five days from a lady in the third week of gastric fever, to subdue a bronchitic attack which was superinduced; he has also been obliged to employ the lancet freely in order to relieve encephalitic attacks.

It may not be useless to remark, that within the last ten years the lancet has not been in such requisition as it was during the preceding decade: the fevers in general have had less of an inflammatory character. Irish physicians of the present day who are eminently skilful in the treatment of acute diseases, are almost all eclectics, have no fixed routine of practice, but are equally ready to act with the decision which those dangerous contingencies above alluded to may require, or to remain calm spectators of a distemper which often requires nothing more than the *dieta aquea* from the beginning to the end.

This is not a fever which requires a mercurial every night and a drench of infusion of senna and salts in the morning. It would be most mischievous to give purgatives daily; you thus increase the peristaltic movement, and disturb the bowels when it is of the greatest moment to keep them at rest. There are three points to be attended to in gastric fever, as contra-indications, before we prescribe a purgative: first, the outline of the abdomen—when the ribs are prominent and the belly soft; secondly, the condition of the stomach,—when the stomach is irritable, the patient complaining of nausea and sickness, with tenderness of the epigastrium; thirdly, the quality of the discharges from the bowels—if these be serous or mucous, or rendered such by purgatives, then let us withhold these medicines, or administer them with the utmost caution. The purgatives which the writer generally employed, were rhubarb with manna, phosphate of soda in weak broth, Rochelle salts, or a solution of soda taken with lemon-juice; citrate of magnesia, or sulphate of magnesia in infusion of roses. When there was evident deficiency of bile in the stools, blue pill or quicksilver with magnesia, with or without Dover's powder, in minute quantity, were often prescribed.

The management of the surface of the body is of considerable importance. Every evening, (so long as the patient retains sufficient strength) when the heat of skin and anxiety are greatest, the writer is persuaded, from trials made under his own observation, that the tepid shower-bath will be found a valuable remedy. Tepid fomentations to the limbs, renewed frequently, for at least an hour at a time, two or three times in the day, and especially before the usual time of going to rest, will often remove the febrile irritability and dispose the patient to sleep.

(John Cheyne.)

FEVER, INTERMITTENT, or AGUE.—

This disease may be conveniently considered under the three following general heads:—1. simple or mild intermittent; 2. complicated or malignant intermittent, equivalent to the *fièvres intermittentes pernicieuses* of the French writers, the *febres intermittentes comitatae* of Torti and others, and the *epiala* of Galen; 3. masked intermittent, or the *febres intermittentes larvatae* of authors.

1. *Simple or mild intermittent fever.*—This disease consists of a series of febrile paroxysms recurring at times more or less regular, and alternating with apyrexia nearly if not quite perfect. There is generally but one fit in the space of twenty-four hours.

The time intervening from the commencement of one paroxysm to that of the paroxysm next succeeding is called an *interval*, whilst an *intermission* comprises the period from the cessation of one fit to the beginning of the next.

Ague displays itself under three principal forms, which may be considered as *genera*, if the disease constitute an *order*, as it does in the nosology of Dr. Cullen, or as *species*, if it be considered merely a *genus*. These are—

1. Quotidian, having an interval of twenty-four hours, the accession of the paroxysm being early in the morning.

2. Tertian, having an interval of forty-eight hours, the paroxysms occurring at or about noon.

3. Quartan, with an interval of seventy-two hours, the fit commencing in the afternoon, generally from three till five o'clock.

There are sundry deviations from these leading types, but to narrate them all would be a burden to the attention and memory of the reader without proportionate instruction. It will be sufficient to point out those varieties which are of most frequent occurrence.

The double tertian is very often met with. A paroxysm occurs daily, and hence the disease would naturally be supposed to be quotidian; but on observing its course and comparing the paroxysms, it will be found that those of alternate days only correspond in duration and violence, and that they commence about noon. It appears as if the fits of a milder disease were inserted between those of one more severe.

A triple tertian occurs daily with two paroxysms on one day, and on the other one only.

A duplicated tertian returns only on alternate days, but on these days has two paroxysms.

The double quartan has a paroxysm, generally slight and of short duration, on the day succeeding that of the regular quartan recurrence, so that on the third day only is there a perfect intermission.

The duplicated quartan has two paroxysms on the day of attack, with two days of intermission; thus strictly resembling the duplicated tertian, allowance being made for the difference of the primary type.

A triple quartan has a light febrile paroxysm

on each of the days usually allotted to a perfect intermission.

Agues having intervals of five, six, eight, or ten, &c. days' duration are mentioned by authors of repute, but they are acknowledged to be rare. Some of these probably belong to the ordinary types of the disease, and either by the effect of medicines or some spontaneous change in the constitution certain paroxysms appear to be presented, and hence arises the duration of the intermission. Others do not admit of explanation on this principle, but are really what they appear to be, intermittent diseases recurring at intervals of many days; but these are much more frequently masked intermittents, (that is, the symptoms of other diseases, such as hemicrania and various neuralgiæ, or even apoplexy, returning periodically,) than regular agues.

Of the three primary types, the tertian is by much the most frequently met with; the quartan stands next; whilst the quotidian is in some degree rarer than the latter.

The types frequently pass into each other; but we oftener observe that those whose interval is short assume the more lengthened forms than inversely; for instance, the tendency of quotidians to change into tertians is very great. But the contrary mutation, that of a disease of a long interval into one of a shorter, is often observed, and it denotes the increasing severity of the malady, for it is a remark of Celsus that quartan kills no one, but if it be converted into a quotidian, which it never is but by the fault of the patient or his physician, it is then very dangerous. (Lib. iii. cap. 15.) Intermittents, too, not unfrequently assume the remitting form, and this is occasionally attributable to the untimely employment of certain medicines. We very often observe the contrary order, remittents changing into intermittents, and this is the safer change for the patient, as it shows the diminishing intensity of the disease.

Agues are much more frequent in the spring and autumn than during any other season of the year. Those occurring in the former period are generally tertians and quotidians, and are found to yield readily to remedies, whilst those prevailing during the latter are more intractable; and quartan, the most obstinate form of all, (so much so indeed that it is said by Celsus rarely to terminate before the following spring,) is found to constitute a more considerable proportion of the cases.

Symptoms.—The disease rarely displays itself at once under the form of ague in an individual who has not previously laboured under it. The patient feels indisposed, has headach, weariness, and pains of his limbs, thirst, inappetency, white tongue, frequent pulse, high-coloured urine, and dark discharges from his bowels. This feverish state displays its periodical tendency by well marked exacerbations and remissions, the former generally occurring daily about noon. After this febricula, or fever, for though sometimes slight it is occasionally severe, has endured for a time varying from four days to a fortnight, the patient is seized

with a severe rigor, and the ague which the medical attendant, if experienced in this class of disorders, had been expecting, manifests itself.

The paroxysm commences with a sense of creeping or coldness running down the back, the nails turn blue, the features become pale and shrunk, the skin wears the appearance of what is called goose-skin, and the pulse is small and rapid. The coldness soon becomes general, and amounts to shivering with chattering of the teeth; cough, dyspnoea, and oppression of the præcordia occur; there is a sense of painful constriction round the temples; severe aching in the back; nausea and often vomiting. This, when it occurs, seems to have the effect of bringing on the hot stage more speedily; though, without such an occurrence, it succeeds the first stage after it has lasted for a period varying generally from half an hour to two hours and a half. The hot stage is denoted by great heat of the surface, a forcible pulse, intense thirst, dry tongue, headach with throbbing of the temples, and scanty and high-coloured urine; in short, by all the indications of an ardent fever. The mean duration of this stage is from three to eight hours. At its close a gentle moisture, which soon amounts to a profuse sweat, appears on the skin; the pulse becomes remarkably full without losing much of its frequency; the head-ach and thirst subside; the urine, which during the cold stage had been deficient, pale, and limpid, and in the period of excitement had almost ceased to be secreted, is discharged copiously, and deposits a lateritious sediment; and the bowels are either evacuated spontaneously or are readily amenable to cathartic medicine. At the termination of the sweating process the patient feels as if restored to health, a sense of exhaustion excepted. On the following morning, should the case prove a quotidian, about noon of the third day, if a tertian, and in the afternoon of the fourth, should the disease be a quartan, the coldness again commences, and there is a repetition of the symptoms which have just been described.

The duration of a paroxysm varies in the different types. It will be very near the truth to estimate the mean length of the whole paroxysm of a quotidian at sixteen hours, whilst a fit of tertian completes its stages in ten hours, and a quartan in six, of which fully two are occupied by the cold stage. Any considerable excess beyond these periods constitutes a protracted paroxysm of the respective diseases. When this protraction takes place in a quotidian, it is manifest that there can be little or no intermission, and most modern observers would perhaps term such a disease remittent fever, between which and intermittent the boundary line is often very faint. The Greek writers named it *amphemerina* and the Latins *quotidiana continua*.

The paroxysms of all the forms are apt to vary the time of their recurrence, that is, to commence at an hour somewhat earlier or later than those which preceded them. It may be

remarked that retarding are generally to be preferred to anticipating fits, the former showing the power of medicinal agents over the disease, the latter that it is still uncontrolled.

Though it appears certain that ague, like other febrile diseases, has a tendency to undergo a spontaneous cure, or, as it is expressed, to wear itself out, yet this disposition is counteracted by so many circumstances, and our opportunities of witnessing the unassisted power of the constitution over any disease are in the present day so rare, that it is impossible for us to give from observation any suggestion as to the time generally required for this natural cessation. The ancients, whose opportunities of estimating the unaided or imperfectly aided influence of nature over disease were infinitely greater than ours, give us little more information on this point than that already quoted from Celsus, and which has frequently been confirmed by others, that quartans, which generally commence in autumn, rarely cease till spring, and an intimation that a tertian *might* cease spontaneously, or at least without the employment of anti-periodic remedies which they were ignorant of, at the third paroxysm.* It has sometimes, though but rarely, occurred to the writer to see quotidian and tertians cease without the employment of any remedies of that description, after three or four fits, the cessation coinciding with the appearance of an abundant herpes labialis, an appearance always of the best omen in this class of diseases, whether intermittent or remittent. But he has never observed this in quartans, which are much less yielding than the other forms of the disease, and are more frequently complicated with those visceral affections which, from being effects of the disease, become its perpetuating causes, and invest it with a character of great obstinacy. These complications, it must be remarked, not unfrequently occur in the course of tertians and quotidians, and render them intractable, but they are less essentially a part of them than of quartans.

The tendency to relapse is great, and it is very apt to take place on the days corresponding to that of the paroxysm; and hence great caution should be observed after the interruption of the disease, as to avoiding exposure to cold and fatigue, and respecting diet, particularly on these days. A gentleman who had recovered from ague had a relapse at Lisbon from drinking a glass of iced lemonade on the day corresponding to the tertian period, which was the form he had laboured under. Causes apparently slight may occasion a recurrence of the disease at periods so remote that the term relapse would scarcely be applicable. The late Dr. Gregory of Edinburgh was in the habit of relating in his lectures the case of a young West Indian, who, having at some former period suffered under ague, struck his shin against the scraper in going into the classroom of the Institutes of Medicine, and had immediately a paroxysm of the disease. The

writer was stationed at Canterbury in August, 1814, with the corps of cavalry of which he then had medical charge, and which had recently returned from the Peninsula, where very many of the officers and soldiers, perhaps the majority, had laboured under ague. The wind set in suddenly and coldly from the east, and immediately his hospital, in which for months there had been no cases of the disease, was filled with intermittents.

Complications and sequela of the disease.—

It may appear inconsistent to speak in the present department of complications, but it is intended that only such lesions of structure shall be noticed here as result from a long continuance of a mild disease, those dangerous organic changes which are almost essential to the nature of malignant intermittent being reserved for future notice. The tendency of the simplest kind of intermittent to affect the viscera of the abdomen is very great, as is shown by the following fact: if any cathartic be given to a patient immediately after even his first fit of ague, a quantity of dark bilious matter is discharged from his bowels. During the cold stage the blood seems to be largely accumulated in the veins of the viscera generally, and very much so in those of the portal system, so that we find the functions of the alimentary canal and the liver disturbed early in the disease; and merely by its long continuance, even should its general character be devoid of all malignancy, serious organic affections are occasionally produced. That the accumulation of blood in the viscera during the cold stage is considerably instrumental in engendering them, is shewn not only by general reasoning of a very obvious nature, but by the fact that these morbid affections arise more frequently in the quartan, which has the longest cold stage, than in the other forms of intermittent. The following case may serve to illustrate the effect of venous accumulation in generating structural changes. It once occurred to the writer to see a person die in what appeared to be the cold stage of a first fit of ague. Heat applied in various modes, ammonia, ardent spirits, ether, and other stimulants, failed to bring on reaction. He lay as cold as marble, and shivering violently, without any pulse at the wrist, and his heart acting very feebly for eighteen hours, and then expired, his intellect remaining unclouded till within a few minutes of his dissolution. The principal morbid appearance discovered was in the liver. This viscus was very much enlarged, and extending below the cartilages of the ribs towards the umbilicus, had a lobulated appearance, and was gorged with blood; it seemed, indeed, as though it had yielded in those few hours to the pressure of the fluid which distended its vessels. The man had not previously complained of indisposition, but had undergone cheerfully the toils of the Peninsular war, performing his duty as groom to an officer.

To this cause, the remora of blood in the veins of the viscera during the cold stage, is

* Lib. iii. cap. 14.

superadded the *arterial* congestion of the same organs during the stage of excitement; the word congestion, which it must be observed has been used in various senses, being here employed in the signification, now we believe the most usual, of determination of blood, a part of the state of inflammation, but which may exist independent of it, though its long continuance or frequent repetition has a tendency to induce it.

The disposition to these affections of the abdominal viscera is early displayed by a furred state of the tongue and a considerable degree of epigastric tenderness increased by pressure. They are occasionally fully formed during the persistence of a long-continued intermittent, and sometimes, their rudiments being then laid, they attain a fuller development after it has ceased or been subdued by medicine, especially if the patient remain in the climate where the disease commenced. Their existence is indicated by the following signs. The countenance of the patient is pale and bloodless, and if the disease be of some standing, appears puffed and œdematous; occasionally it has a yellow tinge, and yellowness is almost always perceptible in the conjunctivæ; there is great debility, and the patient is breathless on slight exertions; the epigastrium and both hypochondria appear and feel full and distended, and are tender on pressure, but independently of pressure there is a sense rather of weight than of pain, or at most of very obscure pain extending from the epigastrium to the spine. Pain or aching is experienced, too, about the right shoulder or shoulder-blade. The discharges from the bowels are found to be clayey; the urine is high-coloured, with occasionally a jaundiced stain; the tongue has the exanguious appearance of the countenance and is covered with a white or cream-coloured fur; and the pulse is generally small, feeble, and frequent. If these symptoms remain unsubdued or undiminished, diarrhœa or more frequently chronic dysentery and general dropsy supervene, and finally death closes the scene, though generally at a long interval from the commencement of the disease.

In many cases, instead of this complicated state of derangement, in which the spleen, liver, and occasionally the pancreas are involved, we find an affection of the first of these organs only, constituting what is commonly called *ague-cake*. This is denoted by a hard swelling in the left hypochondrium, always indolent at first, and sometimes remaining very long so, and influencing little the general health; but occasionally attaining a great size, becoming extremely painful, and, in climates warmer and more infested with intermittents than our own, inducing rapid death by rupture of the organ.

Persons labouring under these enlarged spleens are observed to be very subject to foul ulcers of the legs.*

Post-mortem appearances.—The milder form of the disease we are now considering is fatal only by means of the consequences of its long continuance which have just been described. The morbid changes generally discovered in fatal cases are, the cellular membrane and serous lining of the cavities distended with fluid, and organic disease in the liver, spleen, and intestines.

The change discovered in the liver consists frequently of augmentation of the bulk of the organ and of the density of its texture, as if from interstitial deposition. In other cases its consistence is diminished, the whole organ appearing to be converted into a dark-coloured pulp resembling a mixture of effused and coagulated blood and shreds of membranous matter. Both the indurated and the softened state are sometimes found co-existing with tubercles dispersed through the viscus. Occasionally the texture is merely more friable than natural, not in the extremely softened state mentioned, and contains small and detached purulent deposits. The only change discovered is sometimes in the bulk of the organ, the texture remaining natural, as in a case related by Grottonelli, in which it had acquired such a size as completely to mask the stomach and intestines, the left portion extending into the left hypochondrium and adhering to the spleen, so that it could not be separated without tearing, the substance being nevertheless perfectly sound.*

The spleen is often found much enlarged, sometimes to quadruple its natural size, and to the weight of six or eight pounds. Morgagni, indeed, mentions a case in which it attained the weight of eight pounds and a half, and occupied nearly the whole of the left side of the abdomen.† Such enlargements coexist with affection of the liver, but, as already stated, are found to be consistent with a healthy condition of that organ. The density of the viscus is occasionally increased; but in the majority of instances its interior texture is remarkably soft, and it becomes evident that the hardness felt in the left hypochondrium before death had arisen from the extreme distention of the tunic of the spleen from the quantity of fluid effused into the organ; and the pain felt in a viscus possessed of little sensibility appears to arise from inflammation of its covering induced by the same distention. This inflammation is often visible after death, the tunica propria being highly injected, as if by art. When the organ is examined, it is hard, tense, and resisting; but on being cut it is found to consist interiorly of fluid, sometimes greyish-black, sometimes having the deep purple of lees of wine, intermixed with mere shreds of fibrous or membranous matter. Should death take place from rupture of the spleen, it is preceded by lancinating pain of the abdo-

* Ad acutas et chronicas splenitidis eisdemque succedentium morborum historias animadversiones. Florentia, 1821.

† Epist. xxxvi. p. 17.

* Morgagni de Sedibus et Causis, Epist. xxxvi. 18.

men, small and frequent pulse and cold extremities; and on opening the cavity it is found to contain a quantity of dark-coloured fluid which has flowed from the spleen, in which either one or more small crevices, or round and ulcerated apertures, are found. A case is mentioned by Professor Morelli of Pisa, in which an enlarged spleen had contracted an adhesion to the left extremity of the colon, where it turns to form the sigmoid flexure, and its contents had thus been discharged by stool, the patient being supposed to labour under *melæna*. A case is related by M. Gasté in the *Bulletin de la Société Médicale d'Emulation*, in which there was found in the left hypochondrium a large peritoneal pouch circumscribed outwardly, above, and posteriorly by the diaphragm, within by the stomach, and below by a small portion of the colon and the left kidney. This sac contained two pints of a sanies resembling wine-lees, and the spleen occupied the lower part of it. This organ was of its natural size, but its surface was tuberculated, and its concave part displayed several irregular ulcers from half an inch to two inches diameter.

Should dysentery have existed before death, there will be found ulceration of the great intestines.

Remote causes.—The most uniformly operative of these is, unquestionably, malaria; indeed, it may be doubted whether any case of idiopathic intermittent can occur independently of its agency, either as a predisposing or exciting cause. (See *MALARIA*.) Other circumstances may co-operate; an individual, for instance, debilitated by privations of food or sleep, by debauchery or fatigue, is more susceptible of the influence of this poison than one whose strength is unimpaired; and should he be attacked with ague, some of the circumstances enumerated may be considered as the predisposing causes of the disease, and marsh miasmata its *exciting cause*. On the other hand, an individual who has been exposed to the effluvia of swamps, may suffer a fit of ague at once from some trifling circumstance, such as drinking a glass of iced lemonade, (an example of which occurred in the person of the writer,) exposure to cold, &c. when the effluvia should be regarded as the predisposing cause.

Some authors have supposed ague contagious. This was the opinion of Baunarez and Cibot in Spain, Bailly and Audouard in France, and Cleghorn and Fordyce in our own country. Cases have fallen under the writer's observation which have led him to entertain at least a suspicion that such was the fact; but the most forcible case for the affirmative of the question which he has met with is one related by Bailly. "A lady arrived in Paris with an intermitting fever, which she had contracted in the country in a marshy situation. This fever was accompanied by violent vomitings and other serious symptoms, which displayed themselves at every paroxysm, and forced me to give bark. Scarcely was she cured, when her husband,

who had never quitted Paris, but who had had the imprudence not to keep himself apart from her during her illness, was struck with the same symptoms and in a manner altogether similar."

The proximate cause or nature of intermittents will be considered after the symptoms and morbid appearances of the complicated and malignant form have been presented to the reader.

Treatment.—This will be best understood by our examining into the merits of the various remedies employed for the cure of intermittents, and endeavouring to indicate the circumstances of the disease to which they are respectively applicable.

1. *General bloodletting.*—Though frequently useful and often imperiously demanded in the complicated form of the disease, this remedy appears to be one of doubtful value, or even safety in mild intermittent. At the commencement of ague it is very usual to find the intermissions too imperfect to admit of the antiperiodic remedies, such as quinine or arsenical solution, being resorted to for terminating the disease; but antiphlogistic diet, mercurial purgatives with antimonials, and local bleeding to the epigastrium if there be tenderness in that region, will generally suffice, without the assistance of general bleeding, to bring the patient into the condition required for their administration. Should, however, ague in any part of its course be complicated with inflammation, existing, not only during the paroxysm but in the intermission, in such intensity as would under other circumstances indicate the propriety of general bleeding, then it should be employed without hesitation. The writer can state from experience, that cases which had resisted the usual antiperiodic medicines, the disease being kept up by a local inflammation, have been made amenable to their action by bloodletting. But the propriety of practising it indiscriminately as a remedy for ague seems more than questionable; nor, should circumstances render its employment advisable, does it appear to be established that the cold stage of the paroxysm, which is the time selected by Dr. Mackintosh for its employment, possesses any advantage over the intermission, when it is generally performed. The latter period, on the contrary, seems better suited for giving the physician a precise knowledge of the extent of the local disease, and for enabling him to adjust the quantity of blood to the necessity of the case.

The gentleman above-mentioned published, in the 27th and 28th volumes of the *Edinburgh Medical and Surgical Journal*, two papers, advising the employment of this remedy in the cold stage of ague, and containing eight cases illustrative of the efficacy of the practice. Of these cases, four certainly appear to have owed their recovery principally to the bleeding, but in the remaining four the cure was accomplished by quinine; and there is great reason to think that it would have taken place sooner had that remedy been employed earlier,

though the bloodletting had been omitted. The four cases in which the practice was successfully employed were of very long standing; and there is every probability that in them the disease was perpetuated by chronic inflammation of some viscus, though only in the eighth case are the symptoms so detailed as to enable us to fix on the site of the inflammation. In this case it was in the spleen; and all these cases fall under the description of cases to which we have argued that bleeding is applicable. The practice of Dr. Mackintosh, as a general remedy of ague, was subjected to a full and candid trial by Dr. Stokes and Mr. Gill, a narration of which will be found in the 31st volume of the Edinburgh Journal; and if the reader will refer to it, he will probably agree in the sentiment expressed by the former of these gentlemen, that the result is calculated to convey an impression unfavourable to the indiscriminate or even frequent use of bleeding in the cold stage of this disease.

Local bleeding is a safe remedy, and the application of leeches to the epigastrium or either hypochondrium is often of great benefit in the slighter gastric, hepatic, or splenic complications which are so frequently met with, and may be with propriety substituted for general bloodletting in the inflammation of any organ, if not of a sufficient degree to keep up constitutional excitement during the intermission. It may be remarked, too, that there is no inconsistency in these moderate depletory measures being promptly followed or even accompanied by antiperiodic remedies, such as arsenical solution or quinine.

It should be observed that the intermittent fevers of warm countries require and bear more free depletory measures, both local and general, than those of temperate climates. So decidedly is this the case, that many persons familiar with the agues of Rome and Sienna, where they are probably more prevalent than in any part of the world, always commence their treatment by bleeding from the arm.

Purgatives.—These are important remedies in the treatment of this disease, and circumstances counterindicating their employment are of very rare occurrence indeed; a very unusual degree of debility alone forbidding their exhibition, should other symptoms render it advisable. Those containing a proportion of calomel, or some milder mercurial preparation, should be preferred, from the tendency which the disease displays to derange the biliary system. It was the writer's practice always to empty the bowels by such a purgative after a paroxysm previously to giving bark or arsenical solution, and to repeat it occasionally throughout the disease if it appeared advisable; and the result generally showed the propriety of the plan. Irritation or even inflammation of the gastro-enteric mucous lining should not be considered a reason for withholding this class of medicines, for the worst cases of ulceration or other disease of this membrane have been found in the practice of those

who abstained from them; and it may be considered as ascertained that their judicious exhibition neither tends to induce such disease nor to aggravate it if existing; though it certainly is possible to excite considerable irritation there by needlessly tormenting the bowels with purgatives.

Emetics.—It is the practice of many medical men to give an emetic at the commencement of the cold stage, or a short time prior to the period of its expected recurrence, provided this be ascertained. Its administration in the first mode has generally the effect of shortening the cold stage, and rendering the whole fit milder; whilst the giving of it before the fit occasionally prevents this altogether, and breaks the catenation of the fever. Its exhibition in either mode should be considered only preparatory to the employment of antiperiodic remedies; but with this view it may be usefully adopted where there is no tenderness of the epigastrium, the existence of which should be considered as counterindicating it.

Mercury.—The use of this mineral should be directed rather to the complications of the disease than to the disease itself. Ague is almost uniformly suspended by mercurial action; but besides that we can in uncomplicated cases generally attain the same object by milder methods, it must be remarked that the cures effected by its agency are rarely permanent, the disease occasionally re-appearing immediately on the cessation of its action, or shortly after. But in the treatment of the gastric and hepatic complications of intermittents it is of great value; and no experienced medical man would withhold it in such cases. Its employment may proceed *pari passu* with that of quinine or other antiperiodic remedies; or the complications being removed, and the recurrence of the paroxysms being suspended by its action, those remedies may be administered as a security against relapse of the primary disease.

The subject would be left imperfect did we not mention the vigorous employment of calomel in intermittent fever by our practitioners in India. They administer it in scrupledoses for one or two nights, giving a purging draught on the following morning to carry off the vitiated secretions; and it is subsequently continued in more moderate doses till the tongue becomes clean, when bark is administered.* By the same authority we are recommended to give a scruple of calomel combined with two grains of opium, to allay the irritability of stomach which so frequently attends the paroxysm.

Opium.—This medicine has been recommended in the treatment of ague from the days of Galen downwards. It may be given either during the intermission, at the very commencement of the fit, or in the hot stage. The first method is that adopted by practitioners who rely upon opium for the cure of the disease.

* Annesley, Sketches of Diseases of India, p. 491, &c.

Its employment in this way is little known in this country, but has obtained considerable notice in France from a memoir published by M. Jourdain* on the potion stibio-opiacée of Peysson, which is a combination of opium and tartar emetic. The inference we should draw from what has been stated of the effect of opium given in this combination, and from what we have seen of its employment in any form during the intermission, is, that it should not supersede the exhibition of the usual antiperiodic medicines, particularly that of quinine. But small doses of opium will even be found a useful addition to preparations of bark or arsenic in ague occurring in irritable habits, and particularly when it is complicated with an irritable stomach. The second mode of giving it, just at the commencement of the cold stage, shortens this stage very much, and renders the whole paroxysm milder; facts of which patients are so conscious that our soldiers in the Peninsular hospitals regularly applied for an ague-draught (sixty drops of laudanum and a drachm of ether) when they saw their nails turning blue, which is generally the first sign of the commencement of a paroxysm. Lind attributed the following good effects to opium given in the hot stage:—1st. It shortened and abated the fit; and this with more certainty than an ounce of bark. 2d. It generally gave a sensible relief to the head, took off the burning heat of the fever, and occasioned a profuse sweat, free from the burning sensation which affects patients sweating in the hot stage. 3d. It often procured a soft and refreshing sleep to a patient tortured in the agonies of the fever, from which he awoke bathed in sweat, and in a great measure free from all complaints. The same experienced physician was of opinion that the employment of opium during the paroxysms tended, by lessening their force and duration, to render the patient less prone to liver-disease and consequent dropsy.

Various other stimulating matters have been given during the cold stage, with the view of abridging it, and of thus cutting short the whole paroxysm. Oil of turpentine, in doses of half an ounce, has been thus administered, and frequently with advantage. The old means of the eating of garlic and swallowing pepper suspended in warm water.† An active principle of the latter article, *piperin*, has been recently adopted by Dr. Meli, of Novara, as a cheap and, as he assures us, a very efficacious substitute for sulphate of quinine. He advises that it should be given in doses nearly the same as those of the sulphate, repeated at intervals of three or four hours during the intermission.

Mechanical means have been recommended for the attainment of the same object, viz.

abridging the cold stage, and diminishing the severity of the whole paroxysm. These are the application of tourniquets or ligatures to the limbs. It is obvious that the effect of a moderately tight tourniquet and of a ligature will be the same, that of detaining the blood in the limbs compressed by them; and certainly the former, which was originally recommended by Mr. Kellie, in Duncan's Medical Commentaries for 1794 and 1797, is the more convenient mode of accomplishing the object. Mr. Kellie informs us that if a tourniquet were applied in the cold fit on one thigh and one arm of opposite sides for two minutes, a mild hot stage was induced, and the patient felt himself quite relieved. The instruments were allowed to remain for about fifteen minutes, and then on their removal the cold symptoms did not return. The same gentleman is of opinion that if the tourniquets be applied previously to the accession of the paroxysm, the cold stage will be entirely prevented, and that whether the cold stage be either shortened or altogether prevented, the following hot stage will be rendered both milder and of shorter duration. This practice is not much employed; but a recent writer, M. Bailly, strongly urges its being adopted in malignant intermittent where there is much to be dreaded from a recurrence of the paroxysm.*

If any explanation can be given of this singular effect from such a proceeding, it must be found in the impediment presented to that afflux of blood to the interior, which forms so important a feature of the cold fit, by its confinement in the extremities.

Antiperiodic medicines.—We shall now consider that important class of medicines which are given during the intermission for the purpose of preventing the recurrence of the fits, and of thus curing the disease. We have named them antiperiodic medicines, because the property of curing diseases which recur periodically seems the only one which is common to all of them. That many of them are tonics is true; but their power over intermittents does not appear to be in proportion to their tonic quality, nor is it well ascertained that all of them possess such a quality. No practitioner employs arsenical solution, one of the most powerful of the class, as a mere tonic, nor does it seem certain that it is one; for to infer that it is so from the fact that it cures ague would be reasoning in a circle, and we are not aware of any other whence it could be drawn. Mr. Jenkinson, who has extended its use to painful affections of the bones, recommends its employment only in those cases in which there are regular intermissions; and hence it would appear that in these diseases too it is as an antiperiodic that it is selected. Upon the whole, it seems proper to designate these medicines by the general term here employed, till a fuller investigation of their nature, and of that of the diseases for

* Journal Général de Médecine, tom. lxxxvi. p. 305, and Bailly Traité de Fièvres Intermittentes, p. 433.

† Lib. iii. cap. 12.

* Traité des Fièvres Intermittentes, p. 451.

which they prove a remedy, gives us more precise ideas on the subject.

Of these remedies, the first in importance is certainly the Peruvian bark. A few years ago, a disquisition on the comparative powers of the different species of this drug, yellow, red, and pale, would have been requisite; but as one substance, sulphate of quinine, unquestionably the most valuable gift which modern chemistry has bestowed on our art, now represents them all in practice, such a disquisition would be superfluous. Those only who were in the habit of treating many cases of ague prior to its introduction, and had often witnessed the disgust, nausea, and vomiting caused by loading a patient's stomach with many ounces of powdered wood, can form an adequate opinion of the benefit conferred on our practice by the introduction of the sulphate; and this opinion should be further enhanced by the consideration that the ligneous matter of the bark is certainly a direct obstacle to the operation of the essential part of the mass, for the sulphate decidedly exceeds the gross bark in febrifuge power, even though the latter be equally retained by the stomach.

Of the sulphate of quinine, which we shall consider as the representative of bark and all its preparations, two grains repeated every three hours, or four grains every six hours, are generally a sufficient dose in a case of either of the more lengthened forms of intermittent; but in one of quotidian it is preferable to give three or four grains every third hour. In a complicated and malignant disease, when a patient's life probably depends upon the prevention of a paroxysm, it is frequently given in much larger doses, those of a scruple, for instance, repeated at short intervals; and should those previously mentioned not subdue the mild form of the disease, they should be increased; but doses of from two to four grains will generally accomplish all that is to be expected from the drug in the uncomplicated intermittent of temperate climates. The medicine may be given either in pills or in a draught in any agreeable cordial water, to which are added a few drops of diluted sulphuric acid, which very much aids the solution of the salt. The employment of the remedy should not cease with the suspension of the paroxysms, but should be continued some days as a security against relapse.

It will be known to the reader that the propriety of promptly curing intermittents by means of bark was the subject of doubt and controversy from the first introduction of this drug, and that the two most distinguished writers on the subject, Sydenham and Ramazzini, have taken different views of it, the latter attributing all the pernicious results of the disease to the remedy, the former vindicating his favourite from similar charges brought against it by his British contemporaries, and ascribing the evils to their more general cause, the long continuance of the intermittent. That the remedy is unjustly charged with the general abdominal obstructions and enlarged spleens which are so

liberally attributed to it, is manifest from the circumstance that individuals so situated that they can procure neither bark nor any remedial assistance for their agues, and in whom consequently the disease follows its course unresisted, as happens to the peasants of the country bordering on the Pontine marshes, have the spleen occasionally occupying almost the whole abdomen; whilst those in whom the disease is promptly and judiciously treated, escape such complications. But it must be remarked that the employment of bark requires discrimination and judgment, and that much injury may be done by the routine practice of "pouring it in," as it is termed. The following circumstances should deter us from administering antiperiodic remedies, and particularly sulphate of quinine—the intermissions being imperfect, and a recent local inflammation. In the former case, should we employ this class of medicines, we run great risk of converting the disease into a dangerous remittent or continued form; we ought therefore, by means of calomel purges, saline medicines, and occasionally topical bleeding, to endeavour to reduce the patient into an apyretic state during the intermission, previously to commencing their employment. Should a recent topical inflammation of some degree of intensity exist, we should at once proceed to subdue it by bleeding general and local, mercurials, &c.; and if the ague remain after its cure, then may the sulphate be administered; but the antiphlogistic means, with mercurials occasionally, remove both the local and general affection; and if the antiperiodic be employed in this case, it is rather with a precautionary view than because it is rendered indispensable by the existing circumstances of the disease. It must be observed that the precautions here impressed on the reader against employing quinine during the persistence of topical inflammation do not apply to those chronic engorgements of the spleen and other abdominal viscera which so frequently exist in persons long subject to ague, and which are uniformly aggravated by every fresh attack of the disease. Were we to delay the cure of the intermittent till the splenic or hepatic engorgement were removed, months or years might be requisite for accomplishing the object; the antiperiodic, therefore, should be administered at once. It may be remarked, too, that occasionally circumstances exist which render it desirable that the tendency to periodical recurrence should be combated at the same time that measures are taking to subdue a pyrexial or inflammatory state, permanent but slight in degree; in which case arsenic, in the form of Fowler's solution, should be employed in preference to sulphate of quinine, as being less exciting: but should there be observed any increase of the general pyrexial state during its administration, it should at once be withdrawn, and the antiphlogistic remedies alone persevered in. Finally, by examining all the evidence on the subject, and observing the effect of remedies on ague, we shall reach the conclusion that the diseases

which have been attributed to bark do not arise from its judicious employment, though they are occasionally owing to its abuse, but in an immense majority of instances are to be ascribed to the severity and long continuance of a malady either imperfectly treated, or which our art was too feeble to subdue.

Arsenical solution is the antiperiodic medicine on which, next to quinine, the most reliance may be placed. An extensive experience leads the writer to give it a general preference over crude bark; but he thinks it inferior to quinine, though under certain circumstances it may supply the place of the latter valuable medicine advantageously. It has already been observed that it may be given in a more inflammatory state of the system than this medicine; and again, should an individual have been cured of ague by the sulphate of quinine or any preparation of bark, and have a relapse, it will often be found that the same medicine will not restore him to health, it having lost its power over the system by familiarity, and some other antiperiodic must be resorted to, especially arsenic. This loss of power by long continuance takes place with respect to all the antiperiodic medicines; and hence arises an advantage from having several, that one of these medicines may be substituted for another which has lost its influence. The one we are now considering, arsenical solution, the writer has given in many hundreds of cases, and has never seen any permanently ill effect arise from it, nor indeed any ill effect but a little nausea and griping, which a diminution of the dose, or the addition to each of a few drops of laudanum, speedily corrected. The dose in which it is generally given is from five to twelve drops every four or six hours during the intermission.

The sulphate of zinc stands next in the order of power among these medicines. The best mode of administering it is in pills composed of the salt, powdered ginger, and conserve, each pill containing three grains of the sulphate; and of these, two may be given three times a day during the intermission, the number being increased to three and subsequently to four, which are as many as the stomach can bear. It is advisable to avoid drinking immediately after them, as it is apt to induce vomiting.

Various bitters, and combinations of them with aromatics, have been tried, and occasionally have proved successful. Quassia, alone or combined with some agreeable aromatic, is the most efficacious of them; but all are inferior to the antiperiodics previously mentioned. An extract of the bark of the olive-tree (*Olea Europea*) has been employed lately in Spain and France, and M. Pallas* gives many cases of cures effected by its means. Salicina, the alkaloid of the willow-

bark, has likewise been tried in France, and it is said with a success equal to that experienced from sulphate of quinine. We cannot give any opinion of the two last-mentioned remedies from observations of our own; but the statements of others lead us to think favourably of their merits.

Treatment of the sequelæ of the disease.—

An important remedy for all forms of such affections, and one without which other means prove but too often unavailing, is a change from the contaminated air in which the disease originated to a more healthy atmosphere; for it were to take a very partial and imperfect view of malaria to regard it merely as the cause of fever. It is a poison of the whole system, generating various diseases, particularly of the abdominal viscera, and aggravating those which are existing, occasionally by the instrumentality of open attacks of intermittent, but not unfrequently by a slower and more insidious contamination of the frame.

We have considered these sequelæ under two forms, viz. the more complicated and dangerous one, in which the liver and other organs participate, and the simpler, in which the spleen, an indolent and, so far as we know, comparatively unimportant organ, is principally if not solely affected; and we shall observe the same order in our remarks on their treatment.

In cases of the former description, topical bleeding, which may be occasionally repeated, from the epigastric and right hypochondriac regions by means of leeches, and subsequently blistering the same parts, will probably be found serviceable. One or two full doses of calomel should be given with some smart purgative, and then mercury in the milder form of hydrargyrum cum cretâ or blue pill, should be administered with or without eccoprotic laxatives according to the state of the bowels. After this course has been continued for some time, and been for some time suspended, the nitro-muriatic bath, or sponging the abdomen with the nitro-muriatic solution, may be resorted to. The waters of Cheltenham or Harrogate are found beneficial after the inflammatory action has been very thoroughly subdued by topical bleeding and mercury. Should dysentery be co-existent with the liver affection, Dover's powder should be conjoined with the mild mercurials; and leeches may be applied along the course of the colon, whilst anodyne, emollient, or gently laxative enemata should be administered. If dropsy exist, the mercurials should be combined with squill; but these are cases which too often mock the best efforts of our art.

If the case be one in which the spleen only is affected, a general bleeding should be performed if the patient's strength admits it; and under all circumstances local bleeding from the left hypochondriac region should be employed and occasionally repeated; whilst counter-irritation from the same region by blisters, setons, or moxas, should be subsequently adopted. Purgatives, which cause

* *Réflexions sur l'Intermittence chez l'homme dans l'état de santé et dans l'état de maladie.* Paris, 1830.

considerable exhalation from the mucous surface of the intestines, are valuable adjuvants to these measures; six or eight grains of compound extract of colocynth, with three or four of antimonial powder nightly, followed in the morning by a proportion of sulphate of magnesia, or other saline purgative, will answer the indication exceedingly well. The diet should be light and antiphlogistic. Should these means fail to subdue the disease, iodine will merit a trial. Mercury, so beneficial in most chronic inflammations, is rarely, if ever, of service in these cases.

Complicated or malignant intermittents.—It is not easy to present a methodical view of diseases so multifarious and variable as these. Their basis is an intermittent, which may be of any of the usual types; but either from the very commencement, or shortly after the attack of ague, some important organ becomes affected with disease, generally of an inflammatory nature, which complicates the original disorder throughout its whole course, subsiding but not entirely ceasing during the intermission, and becoming dangerously aggravated during the paroxysm, when, and especially towards its close, death occurs should the case prove fatal. These intermittents are distinguished from those we have already considered by the complications in the latter being merely the result of their long continuance; whilst in malignant ague they are a part, and the most important and dangerous part, of the disease almost from its commencement. From the other division of these diseases, which we have subsequently to notice, they are distinguished by the circumstance, that in masked intermittents the character of ague is entirely immersed in that of some other disease, occasionally an inflammatory one, more frequently affecting the nervous system, occurring periodically, but without any other mark of ague, excepting perhaps a very slight chill, not at all resembling the full shivering of intermittent.

Examples of dangerous complications of ague were once frequent in this country, when ague itself was a more common disease here than it now is, as we learn from the writings of Sydenham and Morton; and they are still occasionally met with, though very rarely in comparison with their former frequency, or their present prevalence in countries more marshy, and situated under warmer latitudes than our own. The Italian writers down to the present time are rich in observations illustrative of their prevalence and fatality, for many parts of that peninsula, particularly the vicinities of Rome and Sienna, are prolific of intermittents of the most pestilential character.

The brain and its membranes, the viscera of the abdomen and those of the thorax, are the seat of these complications, and in this order we shall consider them, premising that it is so usual for the organs of the different cavities to be simultaneously affected that the line of demarcation will not be very precise; and when we speak of ague complicated with disease of

a set of organs, it will be understood merely that the prominent and dangerous symptoms are attributable to such disease, not that those viscera only are affected.

Affections of the brain and its membranes.

—The affection of these organs sometimes takes place suddenly, without there having been any thing in the previous symptoms of the intermittent to indicate to the patient or his attendants that any peculiar danger was impending. Werlhoff relates that one evening he met a widow-lady in the street, who entreated him to visit her on the following day, as she expected her third paroxysm. He went according to appointment, and found her not only in a severe fit of ague, but in a state of complete immobility and with the stertorous breathing of apoplexy. It was found impossible to arouse her; the pulse became more and more feeble, and she shortly expired.* A similar case is related by Bailly.† Benoit Simonelli entered the hospital of Santo Spirito at Rome, on the 22d of July, 1822, labouring under tertian; on the twenty-third he had a slight paroxysm and took after it two ounces of bark; on the fourth, towards noon, he was walking in the ward and amusing himself with the other patients, when he was suddenly seized with a violent shivering, followed by high fever, during which he had convulsive contraction and flexion of the fore-arm on the arm, and complete coma, and in six hours he expired.

These are examples of fatality supervening rapidly on the first symptoms of malignancy; but it is not unusual for patients to pass through a succession of paroxysms, attended with convulsions and coma, alternating with intermissions, in which the convulsive movements disappear, and the patient is restored to comparative sensibility and intelligence; yet may he ultimately sink under the disease with all the symptoms of apoplexy, should the recurrence of the fits not be prevented. Independent of the complication, the paroxysms of malignant ague wear in all respects the ordinary character, commencing with fully formed rigor succeeded by intense heat, and this again by sweat, in proportion to the copiousness of which is generally the completeness of the apyrexia. But we often see that when intermittent assumes the complicated and malignant form, the cessation of fever at the close of the paroxysms is less perfect than in mild ague; so that many cases which, from the mode in which the disease commenced and the periodical recurrence of rigors, are classed with intermittents, might, from the imperfection of the apyrexia, with equal propriety be referred to remittents. Indeed, it may be remarked of these two orders of diseases, that though the extreme points of the scale are readily distinguishable by the least practised eye, yet the intermediate degrees are so blended that it

* *Observationes de Febribus.* Venet. 1764.

† *Traité des Fièvres Intermittentes Simples et Pernicieuses.*

would be often difficult to say where intermission ceases and remission begins. It is usual too to find, that when the more intense symptoms of malignancy display themselves, the type vacillates; a disease, for instance, which had recurred at the tertian period, assumes the quotidian form, whilst the paroxysms of one originally quotidian are apt to be duplicated.

The symptoms distinctly referrible to the brain and its membranes are of two orders, those of spasm or convulsion, and those of oppression or coma. Of the former there is not merely the ordinary subsultus of fever, but well-marked convulsive movements, such as the rapid contraction of the flexor and extensor muscles of the fore-arm already mentioned, convulsive twitching of the fingers; occasionally tonic spasm of the same parts or of the lower extremities, so that the flexors and extensors being balanced, the members acquire a tetanic rigidity; firm clenching of the lower jaw, and violent rolling or distortion of the eyes. Should both sets of symptoms occur in the same patient, it will generally be found that those of convulsion precede in point of time, though ere the close of the disease they are found co-existing. The signs of diminished sensibility are stupor, from which it is difficult or impossible to rouse the patient; immobility; incapability of swallowing; eyelids wide open; pupils occasionally dilated, sometimes morbidly contracted; pulse sometimes strong and bounding, at others small and feeble, and stertorous breathing.

M. Lallemand would consider the first set of symptoms, those of convulsion, to arise from inflammation of the arachnoid membrane communicating irritation to a healthy brain, or, at least, to one retaining its functions to a certain extent; in the second he would suppose that inflammation of the cerebral substance itself existed. It is certain that convulsive movements are compatible and are indeed generally found co-existing with coma, more or less considerable; but the opinion of M. Lallemand is supported by the facts, that in those cases of comatose intermittent in which there are convulsive movements, the patient is still capable of being roused to a degree of attention and to display some share of sensibility; and that in cases of coma without convulsion, the marks of cerebral inflammation are more considerable than in those in which convulsions existed.

The appearances found in the dissection of these cases are—inflammation of the arachnoid coat, indicated by intense vascular congestion; effusion of serum between the arachnoid and the pia mater; adhesion between these tunics, so that they form but one thick membrane, into the tissue of which blood is effused, occasionally by granulations of the arachnoid, or by its being covered by a false membrane; inflammation of the brain, shewn by the cortical substance being of a deep brown or reddish colour, of which the examiner becomes at once conscious if he have an opportunity of making a comparison with the brain of a patient who has died

from some other disease;* oozing of points of blood in great abundance from the medullary substance on its being incised, or softening of the organ, and effusion of serum in the ventricles and base of the skull.

These changes may be found co-existing with extensive lesions of the liver, stomach, intestines, or spleen, such as are met with in the examination of those dead from ague with abdominal complication, which we are now to consider.

Malignant ague, with abdominal complication.—The symptoms found in this complication are great pain of the abdomen increased by pressure; pain of the loins; vomiting, sometimes uncontrollable, of matters generally bilious, frequently bloody; discharges from the bowels of the same bilious or bloody appearance, or insurmountable obstruction; great sense of internal heat; tongue dry, and of a yellow, brown, or bright red colour; urine scanty, high-coloured, and often jaundiced; occasionally yellowness of the conjunctiva and skin; ardent thirst; frequently hiccup; pulse occasionally full, more frequently small, sharp, and contracted, and towards the close of the disease, feeble and sunk; the heat of skin often very great in the early part of the disease, but after it has continued some time the temperature is low, with lividity of the extremities, and cases are occasionally met with of which great coldness, not merely of the extreme parts, but of the trunk of the body, is a prominent symptom, not only during the rigor but the whole course of the disease: delirium frequently takes place during the paroxysm, and if the disease continue, it may be further complicated with coma or convulsions, the marks of lesion of the brain or its membranes.

On examination after death, extensive lesions of the viscera of the abdomen are discovered, of which the following are of the most frequent occurrence. The mucous lining of the oesophagus towards its lower part is occasionally inflamed, has a granulated appearance, or has a false membrane adhering to it. That of the stomach is thickened and inflamed, being of a colour varying from rose to reddish brown, whilst its mucous follicles are inflamed and so elevated as to resemble a miliary eruption, the follicles having a diameter varying from half a line to a line and a half, and being perfectly smooth, without central aperture. The mucous lining of the intestines presents in general the same deep shade of colour as that of the stomach; the valvulae conniventes are red and swollen, and there is occasionally, but not often, ulceration in the vicinity of the ileo-cæcal valve. The sanguineous injection is not always confined to the lining of the canal, but occasionally affects the muscular and peritoneal coats. Occasionally, and especially in cases in which the alvine discharges have been sanguineous, we find the mucous coat not merely inflamed, but completely impregnated with what appears to be extravasated blood.

* *Bailey*, op. cit. p. 182.

The liver is found so gorged with blood, that its parenchymatous structure is almost entirely lost, the whole organ being little more than a mass of extravasation, and so soft that when an attempt is made to raise it, it is torn in fragments by the hands. This softened state occasionally alternates in the same subject with a tuberculated and harder condition. The ductus choledochus is often thickened by inflammation, and the gall-bladder is occasionally inflamed and lined with fibro-albuminous concretion. The bile it contains is generally as thick and black as tar. The spleen, occasionally weighing six or eight pounds, sometimes of its ordinary volume, resembles a capsule containing blood or a greyish pulp. When the peritoneal surface of the intestines is inflamed, the omentum is generally dark and vascular.

Ague with thoracic complication.—This species of complication is more rare than the abdominal and cerebral affections; but in the intermittents of temperate climates it often occurs, and in them probably rivals, if it does not exceed in frequency, the disorders of the viscera of the other cavities. It may display itself in the form of bronchitis, of inflammation of the pulmonary tissue, or of pleuritis. It is probable that a congested state of the mucous lining of the bronchi, closely allied to inflammation, exists in very many cases, perhaps in all, during the cold fit and the short and anxious respiration which attends it; for the stethoscope has made manifest a strong sonorous *râle* in this stage, which has totally disappeared on the breaking out of perspiration. A similar remark may be made respecting the pulmonary tissue—the congested state of the lung which exists in the cold stage of ague is, as Dr. Stokes has intimated,* closely allied to the first stage of pneumonia; but we should not consider ague to be complicated with either bronchitis or pneumonia, unless the symptoms of one or the other of these affections were persistent through all the stages of the disease, and perceptible in the intermission; though it will be readily understood that these, like other inflammatory complications, must receive considerable increments during the vascular disturbance which attends the paroxysm, and that their general intensity will be increased by each successive fit.

We need not dwell on the phenomena which will be displayed by this complication, it being sufficient to remark that they are those of ague combined with the symptoms of pulmonary catarrh, pneumonia, or pleuritis. In cases of fatality, the lesions of tissue customary in the latter diseases will be discovered, with probably some marks of disease in the viscera of the abdomen, the affections of which it is so usual to find associated with all the other complications of ague.

Treatment.—The indications of cure are, to subdue the local affection, and to prevent the recurrence of the paroxysms, each of which, as has been explained, adds to its intensity. But we

must not expect, in endeavouring to accomplish the first object, that the general system will bear those full depletory measures which are required by an idiopathic local inflammation. Rarely can we proceed beyond one general bleeding, and the topical detraction of blood by cupping or leeches, in our antiphlogistic treatment. The rule furnished long ago by Sydenham for our guidance in the management of epidemics in general, admits of very important application to the treatment of malignant intermittent, that we should endeavour to seize the genius or character of the prevailing disorder, and regulate our measures accordingly; for certain agues—those of some climates, and of different seasons of the same climate—are found to bear depletion better than others. It need scarcely be remarked that our local means should be directed to the head, thorax, or abdomen, according as the viscera of one or other of these cavities is the seat of topical lesion, and, consequently, the source of danger. Blisters to the nape in head-affections, and to the thorax and abdomen when they are the seats of disease, should not be neglected. Calomel should be freely administered, especially where the complication is situated in the head or the abdomen; and in the latter case, should the irritability of the stomach induce vomiting, opium should be conjoined with it. Emetics are rarely admissible, for they will tend to aggravate muco-gastritis, which is so frequent a complication, that perhaps no malignant form of the disease is free from a degree of it.

Whilst these measures are proceeding, or after they have been employed for a short time, antiperiodics, especially the sulphate of quinine, should be administered. If the symptoms permitted delay, it might be advisable in every case to abate the local affection by bleeding, general and topical, and by blisters and mercurials, previously to their exhibition; but in many cases we are under the necessity of deviating from this more scientific plan, and of endeavouring to prevent paroxysms, from which much danger is apprehended, by their early employment. An experienced French writer, M. Pallas, recommends that, in cases of gastrointestinal irritation, each dose of quinine, the antiperiodic he recommends, should be conjoined with a grain of the watery extract of opium. If we succeed in stopping the recurrence of the paroxysms, the local affection, which owed much of its intensity to the increase that took place at every fit, frequently subsides easily without leaving any dangerous lesion of structure; but in other cases it must be acknowledged, though the paroxysms are suspended, the disease proceeds in its fatal course under a complicated continued form. It will be readily understood, as we employ quinine or other antiperiodic medicines for the object of suspending the paroxysms, and not on account of their tonic powers, and as topical antiphlogistic remedies may with propriety accompany such an employment of them, that the diet and general regimen of the patient should, with the exception of those cases in which there is

* Edin. Med. and Surg. Journ. vol. xxxi.

morbid coldness throughout the disease, be perfectly unstimulating.

Proximate cause or nature of ague.—We now reach the most difficult point, that of deciding upon the precise nature of those changes effected in the system by malaria, of which the symptoms of ague are the signs. Of these changes two views are taken, each by a different set of pathologists, similar to those entertained by them respectively of continued fevers. By the one party, the localists, a paroxysm of ague is deemed the sign of an intermitting local inflammation; whilst by the other it is thought to be a fever,—an abstraction if you will,—which is known by certain signs, but with the intimate nature of which we are not fully acquainted; and of which, though it is acknowledged that topical inflammation may accompany or complicate it, such inflammation is not thought to be the very essence and the cause of all its phenomena. We shall present the reader with a brief view of the facts which have furnished arms to the advocates of the respective opinions, with little more of commentary on our own part than is necessary to their being fully understood; leaving him to form the conclusion in a matter, which, now that there is no dispute respecting the treatment of the disease, may be considered rather speculative than practical.

The opponents of the first opinion, that of the localists, remark, that though sanguineous congestions unquestionably exist during the paroxysm of intermittent, and cease at its close, yet it is not easy to conceive actual inflammation, with its general thickening and lesion of tissue, as being thus fugacious. Sanguineous distention is an essential part of inflammation; but if we consider it as constituting the whole of that state, the distinction between congestion and inflammation is at an end, and it would perhaps not be very easy to draw the line between the latter and the occasional condition of the erectile tissue. Besides, if we regard the lesions which are discovered in fatal ague, of which so full an account has been given in the preceding pages, it will be impossible to conceive that such extensive disorganizations should have been produced during the last and fatal paroxysm. It will be evident that the inflammation which operated such changes must have been existing in the parts for a considerable period, and, consequently, that intermitting symptoms ought not to be ascribed to this permanent cause.

The localists appeal from the reasonings of their opponents on the necessary fixity or permanence of inflammation for a period longer than the duration of a fit of ague, to examples of external inflammations, such as ophthalmias and cutaneous affections, of which many are to be found in authors, and particularly in the work of M. Mongellaz.* If these cases are carefully examined, it will be acknowledged that almost all of them are rather examples of the aggravation of inflammation during a paroxysm of

ague, than of actual intermitting inflammations. But it must be allowed that all do not appear to be instances of the former description; but that some cases are mentioned which lead us at least to doubt of the necessary permanence of inflammation during a considerable period. As good an example of this kind as is perhaps to be met with, is given in the lectures of Dr. Elliotson, published in the Medical Gazette, in which the bites of leeches which had been applied to the abdomen on account of a diarrhoea with some tenderness there, became itching and tingling, and red at a certain hour every evening, the patient, a boy, becoming at the same time excited and feverish. There was reason to think that he had been exposed to the influence of malaria, and he was cured by quinine. Allowing a certain degree of force to these cases, we may still be permitted to remark that it is one thing to prove that inflammation may be a fugacious and intermitting affection, and another to show that the phenomena of simple ague arise from an inflammation of this kind, existing we know not where, and disappearing and recurring at intervals; though certain French pathologists, it is true, assure us, but on not very sufficient grounds, that it is seated in the gastro-enteric mucous lining; and it may, besides, be observed that these recurrent external inflammations, if there be no other disease existing in the system, do not produce the perfectly formed symptoms of a fit of ague. From the facts stated respecting the inflammations which attend ague, it appears that the doctrine of the localists requires a more ample and impartial investigation than it has yet received, and the consideration how far a permanent inflammation may manifest its existence only at intervals and periodically, and by the phenomena of a fit of ague, should form an important part of such investigation. The extreme feeling of debility, the pain and giddiness of the head, the aching of the loins, a certain degree of obscurity of the intellectual faculties, and the intense coldness of the surface, favour the opinion that the nervous system is the part primarily instrumental in producing the general symptoms, but how far it is impressed by some local lesion lurking in the frame, remains still to be proved.

Intermittence is, so far as we yet know, an ultimate or unexplained pathological fact. Speculative attempts at its explanation have been offered to the public, and we shall present the reader with that of M. Bailly, because it is founded in some degree on induction from facts, and possesses much more ingenuity than any other, though we acknowledge that it leaves unexplained phenomena, which, if it were successful, it ought to embrace, and reposes in part on an assumption which requires proof. M. Bailly first observes that in situations and seasons in which intermittents affect the human species epidemically, epizooties reign among the lower animals, of which he cites numerous examples; but, however their symptoms may vary in other respects, in one point they all agree, that of being strictly continued—inter-

* Essai sur les irritations intermittentes.

mittence being never observed in the diseases of brutes. M. Bailly then remarks that in the mode in which the actions of life are performed, we differ in one sole circumstance from domestic animals; and in this he conceives that the explanation of the occurrence of intermittents in the human subject is to be found. Animals preserve, during the whole of their existence, sleeping or waking, in all the acts of life, the same horizontal position, and consequently the heart, abdominal viscera, and brain retain the same situation relatively to each other; but man, on the contrary, changes from the vertical to the horizontal position, and consequently in him each nycthemeron (period of one night and day) consists of a succession of excitations or sanguineous congestions, which are felt according as he is in the erect or horizontal position, and according as these organs change their situation relatively to the heart, in the abdominal viscera or the brain. These varying congestions of course constitute the physiological or healthful condition of the generality of persons; but (argues our author) every pathological or morbid state is but the exaggeration of a physiological or natural one. The sanguineous congestion of the digestive organs displays itself in a degree which may be considered morbid in females or other delicate persons, who are either sick on first assuming the erect posture in a morning, or feel a total inaptitude for any occupation till they have taken food; and is well illustrated by that febricula, first described by Ræderer and Wagler, which may be said to constitute the habitual state of many literary and other sedentary persons. This slight disorder manifests itself simply by burning heat of the skin, with little acceleration of the pulse, and during it the patient pursues his accustomed avocations. At night he is either hot and sleepless, or is in a profound but painful and agitated sleep, and in either case feels unrefreshed in the morning; but if he remain in bed, the skin becomes soft, moisture is felt on the surface, in fact a sort of crisis takes place, and he feels tolerably well on the following day; but if he rise before this light sweating stage may have occurred, he remains all that day with a hot and dry skin, his countenance wears an expression of fatigue, his mouth is dry, his limbs are feeble, he feels oppressed, and without having any decided indications of disease, feels equally incapable of thought and action. M. Bailly supposes that this disorder is a gastro-enteric irritation produced by the erect position acting on a delicate and sensitive frame; that the horizontal posture diminishes it, and that if the patient remain so long in this posture as to bring this irritation to the lowest point, the functions of the skin are then restored, and the indisposition is removed temporarily by crisis. MM. Ræderer and Wagler have observed that nothing tends so much to the production of intermittent fever in this delicate class of persons as the suppression of these morning perspirations.

What has been described above, which is in some degree pathological, is but an excess of

what exists in all individuals, and intermittent fever is but a further grade of such excess, or, as Bailly expresses it, is the exaggeration of that assemblage of organic acts which complete a nycthemeron, and which takes place in the following manner:—1st, morning congestion of the stomach and intestines; 2d, augmentation of the different nervous influences which it produces throughout the system, and which according to the particular disposition of the individual gives rise to one set of nervous symptoms rather than another, or which excites that part of the nervous system which penetrates all our organs accompanied by blood-vessels when intermittent fever takes place; 3d, cessation of this congestion by the horizontal position.

It would be unjust to deny the ingenuity of all this, which has received much more illustration from its author than we can transfer to our pages; but it must be remarked that it proceeds on the supposition that the cause of ague exists in the digestive canal, which in the present state of our knowledge of the subject can be considered as little more than a postulate, and whilst it provides an explanation for quotidian intermittent, leaves tertians and quartans unexplained, which are considerable lacunæ in the hypothesis. Other speculations have been offered to the world, one, for instance, by M. Roche, who says that intermitting fevers arise from intermitting causes. These prevail in spring and autumn, when there is a great difference between the temperature of day and night, and when in a few hours there are sudden alternations from great heat to comparative cold; the malaria, too, which is generated is intermitting in its operation, for that which is produced in the middle of the day is so diffused by the rising of the heated air which is impregnated with it, that it does not act, but when concentrated in the condensed and chill air near the surface of the earth, cooled by radiation during night, it is in a state fit to produce its effect on the system. Did each paroxysm require for its production the application of cold or malaria, and were it in the instantaneous effect of such application, there might be some foundation for this hypothesis; but when it is considered, (even granting what is by no means proved, that malaria acts only at night,) that a considerable period generally elapses between the first exposure to the action of the poison and the appearance of the disease, that indeed there must be such an interval if the poison is to act intermittingly or by a succession of nightly applications, then it becomes manifest that to assume that the disease must imitate the preceding movements of its cause is the most extraordinary *non sequitur* that ever entered into the mind of man. This becomes still more manifest when we reflect that one single exposure to malaria will produce, days or weeks after, an attack of ague which shall last for weeks or months; as is often exemplified in the case of sailors sleeping one night on shore; and happened to a friend of the writer, from resting, when travelling, for a

few hours in a marshy situation where ague was prevailing.

Masked intermittents.—These may be succinctly described to be certain diseases familiar in a continued form to medical men and our nosologies, recurring at intervals in paroxysms of greater or less duration, when thus periodical apparently owing their origin to the influence of malaria, and remediable by the means employed to cure intermittent fever.

It were no easy matter to give a detailed account of all the diseases which have been observed under this intermitting form; to name those which have been remarked by authors to put on this character will be sufficient to make the profession aware that, whilst malaria is in operation, they must not expect all the diseases which are the result of it to assume the regular form of ague, but that such curious and anomalous disorders as those of which we are about to furnish them with little more than a list, will fall under their observation, and will require for their cure a treatment different from that of their continued type.

These diseases are either inflammatory or nervous. Of the first class there have been mentioned examples of pneumonia;* pleuritis, tertian;† carditis;‡ otitis;§ peritonitis (fell under the writer's own observation); ophthalmia, frequent; coryza, frequent; tertian swelling of the head;|| quotidian and tertian urticaria;¶ quotidian scarlatina; livid spots, probably of purpura, quotidian;** tertian erysipelas;†† rheumatism, quotidian, tertian, and quartan;‡‡ gout, first quotidian, then double quartan; epistaxis, quotidian; intermittent odontalgia and cephalalgia, very frequent; quotidian inflammation of leech-bites;§§ encephalitis and meningitis, quotidian, tertian, and quartan;||| gastro-enteritis;¶¶ diarrhoea, tertian*** and quotidian, frequent (from the writer's observation): and dysentery has not unfrequently been found complicating the paroxysms of an intermittent; but it may be questioned whether it have itself been met with as an independent intermitting disease meriting the name of a masked intermittent. Other intermitting inflammations are mentioned by authors, but on close scrutiny it will be found that many of these diseases have been permanent, and that the observers have not duly discriminated between a diminution of intensity and total intermittence.

Of the nervous affections the following are the most remarkable: asthma, frequent, but many cases which have occurred in the practice of the writer lead him to suspect that the periodical exacerbation of permanent bronchitis has been occasionally confounded with intermitting dyspnoea; periodical hysteria and epilepsy, frequent; intermitting deafness, type tertian;* tertian convulsions and blindness;† quotidian dumbness;‡ periodical sneezing, three paroxysms occurring every evening, and each paroxysm comprising three hundred sneezes;§ tertian eructation, at the rate of three hundred eructations per hour;|| periodical flow of leucorrhœa, with lypothymia, convulsions, and mutism; intermitting palsy is mentioned by many, and an excellent example of intermitting hemiplegia of the left side is related in Dr. Elliotson's lectures published in the Medical Gazette. It was generally tertian or quartan, but once recurred at the interval of sixteen days.

But neuralgia is by far the most common form of masked intermittent, exceeding in frequency of occurrence, so far as the writer has had opportunities of observation, all the other forms of this disease collectively; and it may be questioned whether many cases, supposed to have been examples of the periodical recurrence of inflammatory disease, were any thing but a painful affection of the nerves of the part. The anterior tibial, occipital, and sciatic nerves have been observed to be the seats of quotidian, tertian, double tertian, or quartan neuralgia.¶ Many cases, commonly entitled spasmodic asthma, have been supposed by some to depend on the same disease situated in the pneumo-gastric nerves, and instances of intense periodical pain in the region of the heart, extending thence to the middle of the left biceps, with small and fluttering pulse, deadly paleness, and inability of making the slightest movement, which the writer strongly suspected to be the same affection seated in the cardiac nerves, and which were remedied by quinine and anodynes, have fallen under his observation. But the branches of the fifth pair of nerves are certainly more frequently than any other the parts affected by periodical neuralgia, and we shall describe the disease, when so situated, as the representative of all its forms. It prevails much in spring, particularly during the prevalence of strong easterly winds, affects most the quotidian or double tertian type, and the invasion of the paroxysm often takes place at ten or eleven in the morning, but occasionally at night, and sometimes as early as three in the morning. Its commencement is marked by a very slight chill, amounting perhaps to little more than some coldness of the hands and feet. Slight pain

* Pallas, *Réflexions sur l'Intermittence*.

† Sauvages, *Arloing*.

‡ Ibid. et *Juncker*.

§ *Mongellaz* and others.

¶ *Mongellaz*.

|| Ibid.

** *Storch*.

†† *Mongellaz*.

‡‡ Ibid. and others.

§§ *Elliotson*, Lectures published in the Medical Gazette.

||| *Leucaire*, *Parent du Chatelet*, *Martinet*, *Deslandes*, and *Audouard*.

¶¶ *Havard*.

*** *Piequé*, *Journal de Médecine*, 1774.

* *Ephemerides Curios. Naturæ*, 1704.

† Ibid. 1694.

‡ Ibid. 1684.

§ Ibid. 1672.

|| Ibid. 1672.

¶ *Stoll*, *Carron*, *Audouard*.

then begins to be felt either above the orbit only, or both in the forehead, over the cheek, and along the gums of the affected side. This speedily becomes agonizing, and is often attended with injection of the conjunctiva of the same side, lachrymation, abundant discharge from the corresponding nostril, and flushing of the cheek. This goes on for a period varying from four to six hours or longer, then subsides with slight moisture of the skin, and finally disappears totally, with the exception of a little soreness of the part which had been the seat of pain. During the paroxysm there is heat of surface, and the pulse becomes rapid and is increased in force. Throughout the disease the urine is high-coloured, and deposits a brick-dust sediment; and the tongue is furred, till the state of the digestive organs is corrected by proper remedies.

Treatment.—The principles of treatment so fully explained under the head of simple intermittent, apply to masked ague, the antiperiodic remedies possessing the same power here as in the more usual forms of the disease, provided the intermission be perfect and the paroxysms recur periodically. In treating the neuralgic forms, it will generally be advisable first to correct the state of the digestive canal by mercurial alteratives and purgatives, and then to endeavour to prevent the recurrence of the paroxysms by the sulphate of quinine or arsenical solution. It may be remarked that we shall often find the latter remedy succeed where the former has failed, and inversely. Carbonate of iron, not accounted a remedy of common ague, has succeeded, when given in doses of a drachm every three hours, where both had been tried without effect, and a case fell under the writer's observation which yielded to powdered bark, after it had resisted the other means mentioned. It is often advisable, especially in the case of females, who are more frequently the subjects of this disease than the other sex, to add some preparation of opium or hyoscyamus to the antiperiodics; and in all cases it is proper to give a full opiate at the commencement of the paroxysm. Covering the parts which are the seat of pain with a plaster of the extract of belladonna frequently diminishes its intensity.

Any notice of those purely sympathetic intermitting paroxysms which are occasionally met with in affections of the urinary organs and in certain chronic visceral diseases, not in their origin at all associated with ague, would be misplaced in this article.

(Joseph Brown.)

FEVER, REMITTENT.—This term is employed to designate a fever of which the symptoms undergo at intervals during its course a marked abatement or diminution, which is called a remission. Such a fever may be considered as holding a middle rank, as to external character, between intermittent and continued fevers; but with respect to its nature, the localities in which it chiefly prevails, and the cause whence it principally if not solely arises, it

bears a closer affinity to the former than the latter. It may be regarded more properly as forming the mean degree in the scale of periodic or marsh fevers, of which intermittent and yellow fever constitute the extreme points. A more intense operation of the febrile cause than is required for the production of intermittent fever engenders remittent, and the more violent the latter the more remote is its character from that of intermittent; or, in other words, the less perceptible the remissions. That a more powerful action of the morbid cause is demanded for the production of remittent fever, is indicated by the circumstance that when periodic fevers are prevailing in certain countries, the permanent residents are often observed to have the disease in the form of ague only, and the mortality among them is small; but strangers unhabituated to the climate and its diseases suffer from remittents, with a proportionally greater loss of life. In more sickly seasons remittents will be the prevailing form among both classes of persons, but strangers are more violently affected, and the mortality among them is greater. Its affinity to intermittent is shown, too, by the tendency which it has to pass into that form, and, inversely, by the proclivity of ague to assume the remitting type. (See INTERMITTENT FEVER.)

Remittent is the endemic fever of warm climates, especially of those of which the soil is marshy; but it is to be met with in the more temperate regions of the earth, and is not unfrequently observed in our own country, especially in seasons of unusual heat, and in those parts of it where under ordinary temperatures agues are prevalent.

In all countries which it invades, this disease is more generally observed in autumn than in other seasons of the year; but it is not unfrequent in summer, and is occasionally seen in spring. The writer has witnessed it in this country in winter, but, from the feeling of indisposition which had long preceded the manifest attack of fever, he had no doubt that the cause was applied the preceding autumn.

Symptoms.—The disease sometimes occurs suddenly, but more frequently it is preceded by unpleasant sensations at the stomach, listlessness, headach, and watchfulness of some days' duration. Its actual invasion is indicated by a feeling of coldness of the extremities and back, and sometimes by general coldness and actual shivering. This sense of coldness speedily alternates with flushes of heat; the mouth at the same time is clammy or dry; there are considerable thirst, nausea, and occasionally vomiting; pains in the head, back, and limbs, with a hurried respiration; and frequent, small, and sometimes irregular pulse. To these symptoms succeeds a stage of excitement, accompanied by a high degree of heat perceptible to the hand of the attendant as well as to the feelings of the patient; dry skin, violent and throbbing pain in the head, flushed countenance, a rapid, full, and forcible pulse, and sometimes delirium. The tongue is at the same time white and furred; there is generally

some tenderness of the epigastrium, with nausea, and occasionally vomiting either of mere watery secretion or of bilious matter. The urine is high-coloured, the bowels are generally torpid, and the thirst is considerable.

In about twelve or fourteen hours, though sometimes not till nearly double this period has elapsed, there is a manifest remission of these symptoms; a moderate perspiration breaks out, the nausea and vomiting (if it has existed) cease, the pulse becomes softer and less frequent, the thirst abates, the heat of the surface is diminished, and the mental state becomes rational and tranquil; but there is by no means a total cessation of fever, and after a comparative calm of two or three hours' duration, there is a renewal of the more intense symptoms of excitement, occasionally preceded by chill or even rigor, but occasionally without such a precursor. After this the disease proceeds in its course, with remissions and exacerbations very variable in their degree and period of recurrence, till about the seventh day, but in other cases till the fourteenth, when all the symptoms cease with a general and copious perspiration, and frequently an abundant eruption of herpes labialis.

The preceding sketch is drawn from examples of the mildest form of the disease, occurring in a warm climate, and in individuals of a vigorous constitution. It will be readily understood that the varieties arising from the different degrees of intensity in the usual cause, from circumstances which modify the action of this cause, and from peculiarities of individual constitution, must be so numerous, that the attempt to represent them all to the reader would be an insupportable tax on his attention and memory. We shall therefore present a picture taken from cases of the most aggravated form of the disease, leaving many intermediate degrees and varieties to be discerned clinically by the practitioner by the aid of some general observations on them, and the circumstances to which they owe their peculiarity.

This form, like the preceding, commences with a sense of coldness and sometimes with shivering, but in general the feeling of cold is rather long-continued than great in degree. It is followed by excruciating pain of the head, with a sense of tightness as if the skull, on a level with the upper part of the orbits, was firmly girt with a cord. The countenance becomes flushed, of a purple hue, agitated, and expressive of pain and anguish; the eyes are vascular and watery; the tongue is white, clammy and moist, or rough, dry, and brown; and pains are felt in the back and lower extremities, those in the latter resembling the sensations which attend the cramps of cholera. Nausea is an invariable symptom, and there is occasionally vomiting of viscid secretion; the intellect is confused, with short bursts at intervals of outrageous delirium, and the pulse is frequent, small, and contracted, and occasionally irregular. The skin is either dry, or, if moist, the moisture is of a nature which indicates rather intensity of suffering than energy of circulation; the heat of the surface on the

first application of the hand is not found to be great; but on longer or firmer pressure the fingers perceive a tingling sensation, the *calor mordax* of writers; the bowels are either obstinately costive, or there are frequent, scanty, and loose stools; and the urinary secretion is either very much diminished or totally suspended.

After this state has endured about twelve hours, a remission takes place, the patient remaining very ill and feverish, yet with less suffering than before; but this tranquillity is of short duration, for in less than six hours in some cases, in twelve or fourteen in others, a slight chill is felt, and there is a renewal of the symptoms described in the last paragraph, with the additional circumstances of a sense of pain in the epigastrium, much increased on pressure; irregular distribution of heat, the *præcordia* being excessively warm, whilst some other parts of the surface are cold; incessant restlessness and jactitation; hurried or laborious breathing, and such insensibility of the skin that blisters sear but do not vesicate. In fatal cases these symptoms endure in varying degrees of intensity, but with very imperfect remissions, from five to seven days. The approach of death is denoted by hiccup, distressing vomiting, hemorrhage from the intestinal canal, sinking of the pulse, muttering delirium, and coldness and lividity of the surface.

Recovery may be expected if the pulse becomes more full and expansive, the heat more equalized over the surface, the pain of the head and epigastrium less distressing, and if the countenance, though still flushed, loses the purple hue which it previously possessed. A favourable inference may be drawn, too, from the remissions becoming more distinct, the conjunctivæ being less vascular, the bowels more obedient to the action of purgatives, the restoration of a more abundant urinary secretion, and the appearance of bile in the matters vomited. These changes, which indicate relief from oppression, and restoration of natural secretion, with the continuance of open and safe vascular excitement, are generally the result of medical treatment. The mean duration of this form of fever, in cases of recovery, is about fourteen days.

The character of remittent fever is modified by the season in which it prevails. In spring, for example, it is more frequently associated with affection of the organs seated in the thoracic cavity, than with prominent cerebral or abdominal complication. In summer, during which season, in the climates which are most frequently visited by it, determinations of blood to the head are frequent from insolation, and even from the high degree of heat independent of exposure to the direct rays of the sun, the brain is the organ which presents the most marked symptoms of affection. The operation of this cause is frequently aided, especially among British troops in warm climates, by the abuse of fermented liquors and ardent spirits. In autumn an affection of the abdominal viscera constitutes the most prominent local affection, generally associated, it is true, with marks

of disorder in the brain and its membranes; but it is prior to such disorder in time, and exceeds it in degree.

This disease, which is so rapid in its march under the ardent heat of tropical climates, when it appears in more temperate regions, for instance in our own country, runs a longer course than any fever, hectic excepted, with which we are acquainted; and its exacerbations and remissions are more distinct than in warmer climates, but exceedingly irregular in the period of their recurrence. The former are not unfrequently ushered in by rigors nearly as severe as those of ague, or by a very well-marked chill; and occasionally so complete a remission occurs as to deceive the attendant by inducing him to suppose the patient convalescent: it has appeared to the writer that this very considerable abatement in the intensity of the disease is most apt to take place at one of the septenary periods from its commencement, especially about the fourteenth or twenty-first day. The whole course of the fever is frequently of forty or fifty days' and occasionally of nine or ten weeks' duration. Its great length is often attributed to relapses, but in the majority of such instances which have fallen under the writer's observation, he has had reason to think that remission had been mistaken for convalescence. This fever is not uncommon in this country and other temperate climates in autumns of unusual warmth; and occasionally, too, it is observed in the beginning of winter, but the cause, it will be found, had been applied during the preceding season.

A striking peculiarity frequently to be observed in the mental state of patients labouring under remittent fever has received little attention from authors, having been noticed only by the late Dr. Jackson,* and in a work published some time ago by the writer of this article.† Instead of the ordinary form of febrile delirium, in which the mind appears occupied with a crowd of unconnected ideas, and quite abstracted from surrounding objects, it in this case retains all its acuteness of perception and vigour of reasoning; but there is one erroneous impression so firmly fixed in it that no argument can shake it, and it is frequently of so gloomy a cast as to impel its victim almost irresistibly to suicide. To accomplish this object, (and in too many cases which fell under the writer's observation it was accomplished,)* the patient will often display all the cunning of a monomaniac. In many cases the impression was that of being causelessly abandoned to the scorn of the world; and in others, of a disgraceful imputation having been fixed upon the character, of the falsehood of which no proof could be obtained. Dr. Jackson relates a case in which the patient, in the exacerbation of a remittent, believed he was to be hanged for stealing coals; during the remission the illusion

ceased; but it recurred with the succeeding paroxysm, and he then declared himself resigned to his fate, and thankful for the respite of the preceding day, that of the remission. It is scarcely necessary to remark that the crime for which he supposed he was to suffer was as imaginary as the punishment which awaited it. During this mental derangement,—an appropriate term, for it has the characters of derangement, not those of delirium,—the patient, so far from there being any general obscuration of the intellect, often displays a self-possession and an acuteness of the mind above the ordinary level of his character. This peculiar state is not often observed in cases of the disease which are physically bad ones, nor is it confined to the advanced stage, when the mental as well as the bodily powers might be supposed to be enfeebled; but it exists from an early period, and is perfectly consistent with a considerable degree of general strength. It is more frequently observed among persons of the upper walks of life and of education, than among those of inferior station and attainments: the officers of the army in Spain, for instance, were more frequently the subjects of it than the soldiers, and it often fell to the writer's lot to see medical officers suffering under it.

No decided peculiarity has been detected in the symptoms during life, or the structural changes discoverable after death, to explain the striking discrepancy from the ordinary form of delirium which occurs in these cases. In all of them there has been evident derangement of the digestive canal, and its subsidiary viscera; and this derangement, in general so apt to produce mental despondency, is acting on a sensorium enfeebled and irritated by fever; but the same circumstances exist in other cases, in which there is either no aberration of mind, or in which, if it exists, it assumes the ordinary febrile form. We are therefore compelled to suppose that some peculiarity of individual constitution co-operates with the disease in engendering this unusual form of delirium; but there is considerable difficulty in discovering in what this individual peculiarity consists. A tendency to actual insanity will not explain it, for delirium has borne this appearance in individuals who have at no other period of their lives manifested any indications of that malady, and the mental illusions always cease on the subsidence of the fever. As it is more frequently observed in intellectual and educated persons than in those of a different class, perhaps mere sensitiveness will explain it; but the subject is involved in much obscurity.

Another form of mental affection not uncommon in this fever, is an indelible impression on the mind of the patient of the necessary fatality of the disease, though there may be nothing in its physical symptoms to excite the apprehension of the attendant. We know not whether this can be considered as a mental illusion or not, for in every case which has fallen under our observation the patient's prediction has been fulfilled, and we feel in doubt whether the mental impression was instrumental in the accomplish-

* Sketch of Febrile Diseases, by Robert Jackson, M. D. p. 123, et seq. London, 1817.

† Medical Essays by Joseph Brown, M. D. p. 48, et seq. London, 1828.

ment, or whether it did not itself proceed from some deadly feeling of the patient which language could not express, and of which the cause did not display itself by manifest signs. Dissection has thrown no light on this point.

Certain disorders are found to follow remittent fever. Of these, diarrhoea and dysentery are most frequently observed, and it may often be remarked that one or other of these disorders, especially the former, prevails simultaneously with it, and an attack of either of them appears to be equivalent to one of fever, those who suffer from the one escaping the other. Occasionally, too, an attack of bowel-complaint, accompanied with constitutional disorder, precedes the invasion of remittent, and passes so insensibly into it, that the attendant is at a loss to say at what precise time the fever commenced. Dropsy is a frequent sequel of this fever, especially of the cases complicated or followed by diarrhoea. In cases in which the head has been much affected by the disease, the mind, during convalescence, betrays a degree of feebleness almost approaching to idiocy, from which recovery is very slow.

Appearances on dissection.—The changes of structure discovered in fatal cases of this disease resemble so much, or rather are so identical with those observed in complicated and malignant intermittent, of which a full account is given in the preceding article, that a brief narration here, and a reference to that article, will furnish the reader with ample information on the subject.

In the head are observed, vascularity of the membranes of the brain, and effusion of serum or gelatinous fluid between them; fluid in the ventricles in greater quantity than is ordinarily observed, and oozing of blood on cutting the hemispheres transversely; but it must be remarked, that occasionally death, preceded by delirium or coma, takes place, and yet no morbid appearance of the brain or its membranes can be discovered; and we may go further, and state that cases have terminated fatally, and, on examination by acute and experienced observers, no structural change of any organ has been detected; though it must be acknowledged that such cases are so rare as to constitute the exception, not the rule.

In the chest, adhesions and serous effusion are occasionally discovered between the pleurae and in the pericardium; the bronchial lining is frequently unusually vascular, and the parenchyma of the lungs is congested or inflamed. These changes are most discernible in vernal remittents. On examining the abdomen there are found inflammation and sometimes ulceration of the lining of the digestive canal, with occasionally an effusion of blood between the mucous and subjacent coat. The liver and spleen are often enlarged, and unusually soft; and the urinary bladder is occasionally contracted in size, and has its mucous lining studded with clots of blood.

The question of the nature of periodic fever having been discussed at some length in the article on intermittent, to examine how far

these pathological states are strictly essential to the disease, or are to be regarded as mere concomitants or effects, would inevitably lead to a repetition of the arguments employed in that article, which we are desirous of avoiding. British writers on remittent fever have generally confined themselves to the relation of facts, and in their works it has generally been implied, if not positively stated, that this fever like others is a condition distinct from inflammation, but very generally associated with it, and that this association should receive full attention in the treatment. The French writers assume a more decided tone, and a numerous class of them, proceeding from the postulate that every fever commonly considered essential or primary is but a symptom of a local inflammation, regard periodic fevers as mere indications of intermitting or remitting phlegmasie. M. Rayer's doctrine is different from this. According to his views, intermittent fever is a cerebro-spinal neurosis, and remittent fever he degrades from the rank of a disease capable of nosological classification to that of "various complications of intermittent fever with other disorders."*

Treatment.—This, as in the case of most fevers, must vary so much according to the various circumstances of the disease, that it is impossible to lay down rules with respect to the employment of any remedy which shall not admit numerous exceptions.

General bloodletting, in attacks of the more ardent forms of remittent, may be employed freely at the commencement of the disease, and its repetition may be speedily required in such cases, if the force of the circulation is not diminished by the first bleeding, and especially if there are indications of cerebral affection; and even in the more sunk and depressed forms, one bleeding at the commencement relieves the system, and, aided by the warm-bath and other remedies, conduces materially to the safety of the patient. Good effects are occasionally obtained in the latter description of cases, by drawing the blood whilst the patient is in the warm-bath; but we should be more sparing in quantity than in attacks of a more ardent disease. In the more protracted disease of temperate climates, it will rarely be advisable to perform more than one general bleeding, and even this in delicate subjects may be frequently dispensed with.

Free local bleeding, by cupping or leeches, from the vicinity of organs affected with inflammation, is always safe at the commencement of remittent, and may be often performed with advantage at a late stage.

Purgatives, so administered as to unload the bowels without needlessly irritating them, are valuable remedies. Pills of calomel, with a proportion of extract of colocynth, powdered rhubarb or jalap, followed by a solution of neutral salts, answer the purpose exceedingly well.

In the more intense and excited variety of

* Dictionnaire de Médecine.

the disease, cold affusion may be employed during the exacerbation with great benefit; in milder cases, cold sponging at intervals during the same period will accomplish our object with less shock to the feelings of the patient.

Cooling, acidulated drinks, and draughts with liquor ammoniæ acetatis, or the ordinary saline draughts, tend to allay thirst, and, on the whole, to diminish the degree of excitement. There is so great a tendency to vomiting in this disease, and if excited it is so difficult to subdue it, that antimonials are not suitable remedies.

The local affections which manifest themselves during the course of the disorder require attention. If there be much pain of the head, with or without delirium, besides bleeding by leeches from the temples, the scalp should be shaved and kept incessantly cool by sponging with cold water, or the constant application of wet cloths. Vomiting, which is a very distressing symptom, is most effectually relieved by the application of leeches and hot fomentations to the epigastrium, followed by a blister and the internal employment of some preparation of opium, for which the ordinary effervescing draught furnishes a convenient vehicle. Should diarrhoea exist, leeches, and subsequently a blister to the umbilical region, unloading the bowels with castor oil, and afterwards the employment of hydrargyrum cum cretâ with Dover's powder, will be found to be its most suitable remedies.

Independently of its effect in relieving vomiting or diarrhoea, opium is a valuable remedy in the advanced stage of the disease, to allay irritation and procure sleep. Mercury is of use as a purgative, and as a means of correcting the morbid secretions and condition of the intestinal canal, and the organs associated with it; but the attempt to supersede the febrile action in remittent by bringing on that of mercury we have never seen successful. It is true that on the subsidence of the fever pyalism takes place, and is often exceedingly injurious to the patient; but there is never reason to think it instrumental in producing convalescence.

We are recommended by some writers to attempt to cut short the disease by the administration of bark, arsenic, or other antiperiodic remedies as in intermittent; but the remission must be so perfect as to amount to an actual apyrexia, and the disease must, therefore, become identified with intermittent, before such a plan can be attempted with propriety; for we have almost uniformly observed that the employment of any antiperiodic in actual remittent not only failed in its object, but has invested the disease with a more continued and dangerous character.

The diet at the commencement of the disease should consist of the lightest and most cooling diluents, such as tea, tamarind-water, lemonade, &c.; but in the advanced stage more nutritious matters, sago, arrow-root, panada, chicken-broth, and even a little wine may be allowed. In some of the more sunk and

oppressed forms, it may be advisable to give wine or other stimulants cautiously at an early period.

As soon as the patient's state will admit of his being removed, it is advisable that he should, if possible, quit the district in which the disease has been generated.

(Joseph Brown.)

FEVER, INFANTILE REMITTENT.—

By infantile remittent is now commonly understood a species of fever to which children, from one year old up to ten or twelve, are very subject, characterized by one or more daily exacerbations and remissions, by pain of the belly and sometimes also of the head, and by an unnatural state of the alvine discharges. This, in the language of the older writers, from its supposed but imaginary cause, was usually denominated a worm fever.

In the last century, indeed, many epidemics, even of adults, were thought to receive their peculiar type or character from the presence of worms, and were distinguished from other fevers by the name of *febres verminosa*. The existence of worms in fevers is now universally considered by all but the vulgar, amongst whom the exploded doctrines of antiquity so often and so obstinately linger, as a mere accidental complication, which may present itself in epidemics of the most different characters, and which exercises little influence either over their progress or their appropriate methods of cure.

During the greater part of the eighteenth century, however, the opposite opinion maintained its ground. Thus Baglivi says, let the diseases of children be what they may, we ought always to suspect worms; and some later writers, amongst whom Van den Bosch rendered himself conspicuous, attributed almost all diseases to the generation of worms in the intestines. Sauvages gives a list of upwards of twenty disorders which he supposed occasionally to have a similar source. Hoffmann endeavours, but very unsatisfactorily, to account for the frequent non-appearance of worms where he had expected to meet with them, in the following passage: "*Pleurumque tamen vermes non excernuntur si febris juncta, quia æstu febrili dissolvuntur in putridum magma.*" The morbid intestinal secretions were thus evidently mistaken by him for the remains of dead and corrupted worms, and it exemplifies a fact of which unfortunately instances are not wanting even in our own day, namely, that preconceived and theoretical notions may go a great way to counteract and pervert even the testimony of our senses.

The importance of worms continued long to be overrated even after Pringle and Sarcione had remarked that their presence in fevers scarcely required any peculiar modification in the treatment of these disorders; and after Bianchini in Italy, and De Haën in Germany, had pointed out how exaggerated was the influence attributed to them by some other writers. Yet even De Haën himself did not

rise altogether above the prejudices of his age on this matter, as he admitted the occasional existence of verminose epidemics, pleurisies, &c.

To British writers much of the credit of exposing and refuting this antiquated opinion is due. St. Clair, of Edinburgh, about one hundred years ago, proved that worms were not always discovered in the so-called worm fever, and pointed out the uncertain nature of most of the symptoms supposed to indicate their existence. Dr. Hunter declared that he had searched for them in vain in those who were said to have died of such disorders; and Musgrave proved that those affections were attributable less to the presence of these parasitic animals than to *saburræ* in the *primæ viæ*. Dr. Clark of Newcastle, on his work on fever, remarks on the impropriety of the term worm fever, and dwells upon the fact which he had ascertained by experience, that anthelmintics will rarely if ever cure it. In the year 1782, Dr. Butler's work on the Infantile Remittent Fever appeared, and it has continued ever since to be the chief authority on this subject. In this treatise he has approximated still more nearly to the truth than any of his predecessors, attributing the symptoms of the above named fever almost exclusively to a weak state of the digestive organs, to morbid accumulations in the *primæ viæ*, and to that peculiar irritability of habit and proneness to fever which distinguish the period of infancy. There is not, he asserts, the least ground for regarding worms in the treatment of the infantile remittent. He thinks, indeed, that they are deserving of little attention in the treatment of any of the diseases of children, except so far as is absolutely necessary for the satisfaction of friends; for though their existence may be a proof of disease, they are neither a cause nor a necessary symptom of such disease. He supports the singular opinion that they are nature's resource for consuming the superabundant morbid humours, and for stimulating the intestines by their movements, and thus assisting the peristaltic motion to carry off the remains of the offending load. This startling proposition, as to the positive utility of worms, which is sometimes attributed to Dr. Butler and sometimes to Rush, does not appear to have originated with either of them, as we find the following passage in Røderer and Wagler's valuable treatise "*De Morbo Mucoso*," of which the first edition appeared in 1762.—"*Infantibus cæterum plethoricis pauciores hospites intestinales verâ emolumento sunt, modestâ consumptione superfluum nutrimentum corpori noxium subtrahunt.*"

Dr. Rush, from the frequency with which worms occur both in the young of the human species and of the lower animals without appearing to produce any disease, inclines to the opinion that they must serve some useful and necessary purpose in the animal economy, such as consuming the superfluous aliment which all young animals are disposed to take,

and even suggests the probability of children sometimes being disordered for the want of them, asserting that it is in the grossest and most vigorous children that they are most frequently found. Worms are often discharged in small-pox and measles from children who never had any symptom of them before, and are frequently discharged in swarms during fevers of all kinds. In the existence of such a disease as the idiopathic worm fever Rush has no belief, coinciding in opinion with the Indians of America, who ascribe the occasional discharge of worms to the fever, and not the fever to the worms. He admits, however, that they may sometimes give rise to anomalous symptoms in the course of a fever, and justify the blending of anthelmintics with the ordinary treatment. The symptoms said to indicate their existence are most deceptive, and none more so than that which is usually so much depended on, the picking of the nose. The actual discharging of worms from the bowels is, perhaps, the only symptom that is truly pathognomonic of their presence. Gardien, on the other hand, ridicules the idea of worms answering any beneficial purpose in the intestinal canal, and asserts that they occasionally give rise to a species of hectic fever. In support of this he states that he had himself met with one example of this, and refers to Morton and Truka for others. He supposes them to be injurious, both by absorbing the chyle, and by the irritation they produce.

Sydenham is thought to have alluded cursorily to the infantile remittent, describing it as a kind of hectic, which holds children a long time, during which they languish with little heat, a loss of appetite, and a wasting of the whole body; and from this description Sauvages has established his species *hectica infantilis*, which is not, however, very well characterized, and might apply to the symptomatic fever accompanying mesenteric and other scrofulous diseases, as well, or perhaps better, than to the one in question, with which it has, notwithstanding, been considered as synonymous by most subsequent writers. An equal degree of doubt attaches to the *febris lenta infantum* of Hoffmann, usually given as another synonym of the disease. The probability indeed is, that several very dissimilar affections were crowded together under these titles, at a period when diagnosis was so much more imperfect than at present.

The infantile remittent, according to Dr. Butler, is distinguished by drowsy exacerbations, wakeful remissions, pain of the head and belly, total loss of appetite, little thirst, and slimy stools. He admits three varieties of the disease, viz. the acute, the slow, and the low infantile remittent.

The acute infantile remittent may begin suddenly, but is more commonly preceded for several days by symptoms of indisposition: the child looks unwell, and his colour is changed; he frequently picks his nose and lips, and has an offensive breath, short dry

cough, anorexia and flatulence, pain in the head and belly, with occasional enlargement of the latter. He starts, grates his teeth, and moans in his sleep; the urine appears milky soon after it is passed, and quickly deposits a whitish sediment. The belly is in extremes, either costive or loose. Fever soon supervenes, and is ushered in by a cold fit. The child is hot and restless at night, and diurnal exacerbations soon succeed. Of these there are often three in the twenty-four hours, one in the forenoon, one in the afternoon, and a third in the night, which is the longest and the most intense. When the fever is very severe, the remissions become very short and almost imperceptible. During the exacerbations all the symptoms become aggravated; the child is drowsy and sleeps, but not soundly, for he starts, moans, talks incoherently, and even screams in his sleep; there is a troublesome flatulence, more frequent cough, and accelerated respiration. Nausea and vomiting occasionally occur. The pulse varies from 140 to 160. In the remissions, all the symptoms abate; the child is wakeful and attentive to things around him, occasionally playful and disposed to leave his bed. If he chance to sleep, he now rests composedly, and the pulse is reduced to 120 or 130 in the minute. The skin is usually dry, both in the exacerbations and in the remissions; and if any sweats occur, they are partial, being limited to the head, breast, or palms of the hand. The abdomen and palms are always warmer than the rest of the body. There is complete loss of appetite, and hardly any thirst, so that the patient in some cases can scarcely be got to take either food or drink, and often rejects them by vomiting as soon as swallowed. The urine is of a transparent orange colour, and the stools are always unnatural, either as to their colour, consistence, or smell; thus they are either paler or darker than in a state of health, more offensive, consisting often almost entirely of slime, and occasionally frothing and fermenting like barm. Worms are in some cases thrown off by vomiting or stool, and sometimes crawl spontaneously out of the body either by the mouth or anus. As the fever declines, the exacerbations become milder and shorter, the appetite returns, long and refreshing sleep and a general moisture of the skin take place, the pulse falls, and the urine deposits a copious sediment, leaving the supernatant fluid of a straw colour; this sediment gradually diminishes, and the stools assume a healthy appearance. The pulse, however, occasionally continues quick long after all the other symptoms have disappeared, and till the patient has nearly regained his flesh and strength. The ordinary duration of the complaint is from one to three weeks or longer.

The slow variety of infantile remittent comes on with the same symptoms, but more gradually and imperceptibly than the acute, the flesh and strength slowly declining, the appetite being unequal, the belly often enlarged, and the breath offensive. There is but one

well marked exacerbation, which, taking place in the evening, lasts till morning, and is succeeded by a profuse sweat. Throughout the day the skin is dry and harsh, and hectic flushings are frequent. The pulse seldom exceeds 140 in the exacerbations, and is about 100 in the remissions. The patient is weak, indolent, listless, and disinclined to move, as any attempt at walking makes the limbs ache. Yet he is rarely so ill as to be confined to bed. The day as well as the night is passed mostly in dozing, and in his sleep he often starts and moans, and picks his nose and fingers till they become sore and scabby. The tongue is white and moist; there is no appetite, and little thirst; the urine is of a deep orange colour; that passed in the morning deposits a sediment—that during the day contains only a cloud. The stools are of the same unnatural character as in the acuter form. When the fever is about to decline, the nocturnal exacerbations and succeeding sweats abate; the flushings become less frequent, whilst all the other morbid symptoms gradually disappear, and the patient recovers his flesh, strength, colour, and cheerfulness. This variety may last for two or three months or more.

The low infantile remittent fever begins suddenly, and for the first week perfectly resembles the acute, save that the head is more affected, and delirium sometimes occurs. After this the low state succeeds, the child becoming quiet, indifferent to surrounding objects, and indisposed to answer questions. He rarely asks for any thing, but takes his food or drink when it is offered to him; the trunk and lower extremities generally remain fixed in one posture, but the arms and hands are almost always in motion when he is awake: sometimes he flings them about, and at other times picks not only his nose and lips, but even his tongue, eyes, and other parts of his face till they become sore. At the height of the disease the difficulty of replying to questions, arising from debility, terminates in a temporary loss of speech and voice, and the jaws are occasionally locked together. He slumbers much during the exacerbations, and in the remissions performs with his hand the gesticulations above described. When the low stage sets in, the eyes are reddish, dull, and inattentive; the countenance is expressive of distress, and the tongue, teeth, and lips are covered with a blackish fur. The patient is particularly uneasy before stools, or the escape of flatulence. The urine and stools, which are of unnatural appearance, are involuntary, yet he is quite sensible. The pulse, which is about 100 in the remissions, rises to 120 in the exacerbations. When the disease takes a favourable turn, the exacerbations become shorter, the child is less drowsy, the eyes are clearer and more observant, the countenance is placid, and the tongue cleaner, the pulse is calmer, and the appetite returns. The voice is regained, and, though weak at first, soon becomes stronger and is frequently exercised, as he cries whenever he is disturbed or wants any thing, or

if he feels himself unable to reply to questions, or to put out his tongue when desired. The strength, flesh, and colour are gradually recovered, and he yawns, sneezes, or coughs, which he was previously unable to do. The urine, which is of a straw colour, is still for a considerable time passed involuntarily. The crying and fretfulness long continue. The stools at length become natural, and there is no complaint made but of weakness. The pulse occasionally continues accelerated till the recovery is complete. The duration of this fever is from a month to six weeks, or even longer.

Perhaps the preceding account might be simplified with advantage in a practical point of view, and a nearer approach to the truth made, by considering the infantile remittent in the first place as a disease of indeterminate duration; by this the first and second subdivisions would be got rid of; and in the second place, as liable to be considerably modified by the habit and health of the individual, and the epidemic constitution of the season, which would enable us to discard the third variety.

According to Dr. Pemberton, who has given a simpler description of this disorder, the fever is merely symptomatic of derangement in the intestines. The affection comes on very gradually, and first manifests itself by irregularity in the bowels, which more frequently are costive, though sometimes they are too much relaxed. In the course of the day there are several slight accessions of fever, which are marked by drowsiness, the child in the intervals appearing perfectly well, though always peevish. The appetite is variable, and the pulse ranges from 100 to 130. This state of things lasts for eight or ten days, when all at once a more violent paroxysm preceded by rigour and vomiting takes place, the pulse rises in frequency, the drowsiness is increased, and the cheeks are flushed; but there is not the least pain complained of in any part, except now and then slight pains shooting through the abdomen. Incessant picking of the skin of the nose, lips, and angles of the eyes, is a symptom which is almost invariably present. The function of digestion seems to be almost totally at a stand, for if any food be taken it is brought up a considerable time after unaltered. "The intestines also seem to be in a manner paralysed; they exert no action on the food, for it passes off like a mass of putrid animal and vegetable matter which had been sometime subjected to heat and moisture, without its having the smallest resemblance either in appearance or smell to those faces where the powers of digestion have been exerted." The appetite is quite lost, and delirium occasionally occurs for two or three days together, but does not indicate that the case will be peculiarly severe or protracted.

There is a symptom which we have met with in this disease, which has been omitted in most of the descriptions of it, viz. a stiffness in the neck, and intolerance of pressure

in the upper part of the spine: with this a general increase of the sensibility of the whole surface of the body seems sometimes to co-exist, so that the child can scarcely bear to be touched in any part. The first of these symptoms has not, however, escaped Heberden. "In the fevers of children," says this accurate observer, "the face is sometimes drawn to one shoulder. I have often seen this, but never knew it continue long after the fever was cured." He alludes to it in another part of his work under the name of "the wry neck of children." Underwood has also noticed it. A similar stiffness about the nape of the neck occasionally occurs in cases of dyspepsia in adults.

The infantile remittent fever, according to Dr. Butter, may be either sporadic or epidemic, and in the latter case it appeared to him to be occasionally contagious. Dr. Sims gives the following description of an epidemic infantile remittent, which occurred simultaneously with the prevalence of a low nervous fever amongst adults. "It was called," says he, "by some a worm fever, though I believe worms were seldom the cause; yet, as that lay apparently in the stomach and intestines, the error did not materially effect the practice." The leading symptoms were heat, thirst, quick pulse, vomiting, coma, and sometimes slight convulsions, an universal soreness to the touch, troublesome cough, and extreme peevishness. The fever was constantly of the remittent kind, the cheeks often appearing highly-flushed, at other times very pale; it lasted for several days, but seldom beyond a week, and the fatality, though greater than in the fever existing at the same time among adults, was not very considerable. Many of those who were seized by it had been subject for a length of time to those symptoms which are thought to point out the existence of worms in the primæ viæ; such as picking the nose, grinding the teeth, and starting out of the sleep, swelling of the belly, white urine, short dry cough, &c. yet worms scarcely ever appeared.

From what we have seen of this affection, as well as from a careful consideration of the best descriptions which have been given of it, we are disposed to consider it merely as a variety of gastric fever, modified by the irritable constitution of infancy, and closely allied to, if not identical with the *febris pituitosa* of Frank. Feverish affections in all feeble and nervous subjects, as well as in infants, manifest a tendency to nightly exacerbations. Richter conceived that every fever which presents remissions partakes more or less of the gastric character; and Selle recognized no other kind of remittent fevers except the gastric and the hectic.

In France this affection is, like most other fevers, considered to be and treated as a species of gastro-enteritis. That a depraved state of the secretion of the mucous membrane exists is evident, but that this necessarily depends in all cases on inflammation has not been satisfactorily made out; and we believe that medi-

cines which slightly increase and modify the secretions of this surface will generally be found to conduct the disease to a favourable termination more speedily than the sole employment of directly antiphlogistic measures.

The irritation which exists about the nostrils and angles of the mouth, and the scabby eruptions which frequently appear in the latter of these situations, together with the state of the tongue, the total loss of appetite, the faint sickly smell of the breath, the morbid condition of the alvine secretions and of the urine, the swelling of the belly, the good effects of purgatives, and the fact that the gradual subsidence of the fever keeps pace with the improvement in the stools,—all taken conjointly seem to point in a manner which cannot be mistaken to the chylipoietic viscera as the original seat of the disease.

The premonitory symptoms, especially the obstinacy and irregularity of the bowels, fetid breath and gradual failure of the appetite, together with the causes of the disease, which seem to consist chiefly in the use of improper food and neglect of the bowels, (circumstances which, like the fever itself, are of much more frequent occurrence amongst the children of the poor than of the rich,) all tend to confirm the above view of the nature of this affection.

The prognosis, under proper treatment and exact compliance with directions on the part of the attendants, is mostly favourable. A return of appetite, an improvement in the character of the evacuations, and the remissions becoming lengthened, are signs of approaching health. If, on the other hand, the exacerbations increase in frequency, and the fever becomes almost incessant, and the abdomen swollen, the case is not without danger. In a fatal case of this kind recorded by Pemberton, the intestines on dissection were found enormously distended, and the mesenteric glands slightly enlarged. No inflammation, however, was detected either in the bowels, peritoneum, or any of the viscera, nor was there any effusion into the abdominal cavity. This inflation of the intestines and occasional enlargement of the mesenteric glands is also mentioned by Hoffmann. The infantile remittent sometimes passes into hydrocephalus, especially when it is neglected or mismanaged. The possibility of such a termination should never be forgotten, else the moment for active treatment will be lost irretrievably. Dr. Cheyne believes that such a transition would be much less frequent if it were more the practice to bleed children in those febrile attacks which commence with sickness, vomiting, and fullness of the hypochondria. Besides, cathartic medicines would then be found to act more readily, and the crisis would occur on an earlier day.

The diagnosis of infantile remittent from hydrocephalus often presents great difficulty. Sims believed that the distinction in children under five or six years of age was often impracticable until within a day or two of the fatal period, when the dilatation of the pupils, and insensibility of the eyes to light, point out the

latter disease too strongly to be mistaken. Pemberton, however, thinks that hydrocephalus may almost always be recognised by the screaming in the sleep, tossing of the hands over the head, and the continual effort to thrust the head backwards; by the intolerance of light, strabismus, interruption of the intellectual faculties, and by food being taken without discrimination or reluctance. In infantile remittent, on the contrary, there is seldom screaming or intolerance of light, there is no strabismus, the intellectual faculties can be roused, the appetite is so totally destroyed that the child can scarcely be persuaded to take either food or medicine. The discharges from the bowels are very unnatural, often black and smelling like putrid meat, sometimes curdled, with shreds of coagulable lymph floating in a dark greenish fluid. In very young children the irritation may cause convulsions, and during the fit it is totally impossible to determine whether the head or the intestines be their source. If, however, after the fit is over the faculties be completely restored, this, taken conjointly with the preceding symptoms of the case, will enable us to ascribe them pretty confidently to disorder of the intestines. Moreover, the convulsions in the latter case occur early in the disease, and occasionally usher in the fever.

According to Gölis, who has been at much pains to discriminate these affections, the infantile remittent, or mucous worm fever as he calls it, may be distinguished from hydrocephalus by having no distinct stages, the pulse being accelerated throughout, and never falling below the natural standard, and by the length of time to which the disease usually runs on, viz. from three to six weeks; by attacking phlegmatic, overfed, and large-bellied children; by its usually well-marked remissions; by the face being pale and swollen, the expression stupid, and the manner sluggish; by the dullness and indistinctness of the pains in the abdomen and head, which are indeed scarcely at all complained of; whilst in hydrocephalus the pain in the forehead is very acute, and alternates with that in the stomach or bowels, and is accompanied with a feeling of tension in the nape of the neck, and occasionally with pains in the limbs. In the worm fever the child sleeps soundly and is awakened with difficulty; it perspires freely after each exacerbation; it maintains its posture in bed, and does not toss about as in hydrocephalus: a strong light does not pain the eyes, nor is there blindness at any stage: the hearing is slow, particularly towards the end of the fever, whilst in hydrocephalus it is peculiarly sharp; the nostrils are moist, and the smell acute, and an intolerable itching is felt in the nose, all of which is otherwise in the affection of the head. In the infantile remittent vomiting is a rare and accidental occurrence, and the respiration is accelerated throughout the whole course of the disease; the bowels are comparatively easily acted on by medicine, and there is little wasting of the body or shrinking of the belly, but on the contrary much flatulent distention. If

convulsions occur, they are not followed by permanent paralysis. The miliary eruption, so frequently associated with gastric diseases, may appear, but it is quite unlike the peculiar exanthematous affection described by some of the German writers as occasionally occurring in the last stage of hydrocephalus.

The means recommended by Dr. Butter for allaying the febrile irritation consist in keeping the patient quiet in bed in a chamber of moderate temperature, and from which the light is in a great measure excluded. All solid food and stimulating drinks are to be withheld, and diluting and slightly nourishing fluids freely supplied, as weak broths, gruel, and barley-water. The bowels should be kept gently open, so that one stool may be procured daily in the low fever, two in the slow, and three or four in the acute variety. For this purpose he was in the habit of giving the preference to the neutral salts, and especially to the sal polychrest, on account of its promoting urine as well as stools, and allaying, as he thought, the febrile irritation by its operation on the nervous system even before it had produced any sensible evacuations. For a child of five years old he usually ordered one drachm of the above salt dissolved in four ounces of water, and sweetened with two drachms of sugar. Of this mixture two spoonfuls were to be taken from time to time, so as to finish it in twenty-four hours. When the body was sufficiently open, he sometimes substituted the nitrate of potass; or when diarrhoea existed, five grains of the extract of conium dissolved in the same quantity of water as the preceding mixture, and to be taken in the same manner. The quantity of extract of conium given daily was in the proportion of one grain for every year of the child's age, and a sufficient quantity of sugar was added to render it palatable. He thought the hemlock had much influence both in relieving the fever and carrying off the looseness. In the slow fever, where the neutral salts failed, he sometimes employed the extract of conium with good effect, at the same time keeping the bowels open with sal polychrest, or with a moderate dose of rhubarb nightly. In this variety he also recommends three or four drops of elixir of vitriol every fourth hour, and the use of weak wine whey by turns with broth and gruel. In some cases bark appeared useful, though he rarely found it necessary to have recourse to it. If the child be very noisy and restless, the abdomen should be repeatedly fomented, by which the patient will often be speedily tranquillized and sleep induced. This measure is especially necessary when the abdomen is tense and swollen.

Such is the plan of treatment recommended by Dr. Butter; but in an affection where there is such strong evidence of deranged and deficient action, not only of the bowels themselves, but also of the stomach, liver, and other viscera concerned in digestion, stronger medicines, which may have a greater power of restoring or modifying the function of secretion in these organs, seem called for. Under this impression

we usually commence with a few doses of calomel, rhubarb, and jalap, in addition to which, if the bowels be very obstinate, a mixture of infusion of senna with salts may be necessary. The occasional interposition of calomel and antimonial powder at night has sometimes seemed to have considerable influence both in improving the stools and in controlling the febrile symptoms. A similar practice is strongly recommended by Dr. Cheyne in his work on hydrocephalus. "Antimonials," says this able practitioner, "in combination with cathartics, and more especially calomel, have appeared to me very useful in those cases of infantile remittent fever in which the sensorial functions are much oppressed, as also in the commencement of febrile attacks of a less definite nature, which are liable to degenerate into hydrocephalus. In such cases I prescribe a pill of calomel and antimonial powder three times a day, interposing between every two pills a moderate dose of the common purgative mixture."

Though advocates for the purgative system in this disorder, we are convinced that it may be, and often is, pushed quite too far. To clear out the bowels, and gradually to modify the alvine secretion, should be our sole object. The danger of inordinate evacuations in this disease was well known to Sydenham, who confined his treatment to an infusion of rhubarb in beer, made so weak as to act rather as a mild aperient and stomachic than as a purgative. By over-purging, the tone of the intestines may be totally destroyed and tympanitis induced. If the case runs on for several weeks, enemata and alternate doses of rhubarb and hydrargyrum cum cretâ, or the latter alone, if the bowels be sufficiently free, may be had recourse to. In very obstinate cases, repeated doses of calomel combined with opium and antimony have been found useful by Dr. Hamilton. With a view of restoring the tone of the intestines and stomach, Dr. Pemberton was in the habit of giving thrice a day a light and aromatic infusion of cascarrilla throughout the whole disorder. In an advanced period of the disease fractional doses of the sulphate of quinine may tend to accelerate convalescence. Dr. Clarke, to whose work we have already alluded, is, however, an advocate for an earlier employment of bark, to which, after the exhibition of an emetic, and one or two doses of an active purgative, he had immediate recourse. "By this means," says he, "the nervous symptoms which so frequently accompany fevers in the delicate habits of children, are for the most part happily obviated." Any little experience we have had in this mode of practice has by no means tended to confirm its propriety.

Manningham, in his treatise on the Febricula in adults, an affection which has many points of analogy with the remittent fever of infancy, appears to have been very averse to the use of bark, as well as of bloodletting and strong purgatives, confining himself to a mild emetic at the commencement, and to occasional doses of rhubarb, and gentle diaphoretics

throughout, along with effervescing draughts during the exacerbations. Stoll, in speaking of the febris pituitosa, which frequently runs on for several weeks, asserts that a very cautious and temporising method of treatment is the safest and most successful. We cite these authorities rather to shew the necessity of great circumspection in the treatment of this disease, than to justify a timid or inert line of practice.

When recovery has at length taken place, a return to the usual diet and way of life should be very gradual, and attention to the regulation of the bowels long persisted in. Preparations of iron, together with country air, regular exercise, and light nutritious food, are the most effectual means of re-establishing the constitution in its original vigour.

(W. B. Joy.)

FEVER, HECTIC. Our word hectic, derived from the Greek *ἡκτική*, habitual, is often used substantively, like the Greek feminine, to denote an habitual or very protracted fever; but more generally it is employed in conjunction with the word fever to designate the same disease.

This fever is attended by the following symptoms. The general appearance of the surface is pale, excepting the cheeks, on which there is often a delicate and circumscribed bloom. There is emaciation, which is progressive, and sometimes very rapidly so, although the appetite is good and the digestive functions appear to be well performed. The pulse is generally hard, and in point of frequency always above the healthy standard of the individual affected, but particularly so at two periods of the day, noon and evening, when there is an exacerbation of all the febrile symptoms, most conspicuous at the latter of these periods; and these exacerbations are preceded by a chill, generally slight, though sometimes considerable. The respirations are rapid and short, readily accelerated by any exertion, and attended frequently with a cough, even where an affection of the thoracic organs is not the source of the disease. The skin is warm, especially in the palms of the hands and on the face, and at the commencement of the fever generally dry; but before it has lasted long, there is a disposition to perspire on any exertion, and a gentle perspiration may generally be observed after the noon-day exacerbation, and one very profuse towards morning, which may be considered as the resolution of that of the evening. The urine is various, being sometimes pale and without deposit, and at others high-coloured, and letting fall a lateritious sediment. The bowels at the commencement of the disease are often costive, and occasionally remain so to the close; but more commonly a colliquative diarrhœa occurs in the advanced stage. The tongue is generally clean; as the disease advances it frequently becomes dry and glazed, and ultimately its surface is covered with aphthæ; there is considerable thirst; a sense of dryness in the throat and fauces; and in the

latter stage of the disorder these parts manifest the same aphthous appearance as the tongue. The eyes are generally bright and expressive, with the conjunctivæ of a pearly whiteness; the nails become incurvated; the adipose and muscular substance are rapidly absorbed, so that the eyes are sunk in the orbits, the temples excavated, and the whole frame is much attenuated, excepting the inferior extremities, which are often œdematous; the sleep is disturbed and unrefreshing; and there is a continual feeling of lassitude and debility; but, with all this failing of the physical powers, the mind remains cheerful and unclouded, and seems to gather hope from the causes of despair.

With respect to mere external character, hectic bears a greater affinity to periodic than to continued fevers, and of the former resembles most the remittent; though cases are occasionally observed in which the severity of the rigor preceding the exacerbation, and the almost complete apyrexia consequent on the sweating stage, assimilate it considerably to intermittent. As to its intrinsic nature it may be considered as the general irritation produced by the sympathy of the constitution with a local disease, "of which it is conscious, and which it cannot relieve itself of and cannot cure."* A severe and enduring local affection is required to produce hectic; but at the same time it is to be remarked that peculiarity of individual constitution is an important element in its production. An amount of local suffering with which a robust constitution might fail to sympathize, or with which it might not sympathize in the form of hectic, may, in a person of more delicacy and mobility, produce what Mr. Hunter has very happily termed this "slow mode of dissolution." The amount of local affection requisite to produce this disease varies, too, according to the nature and functions of the parts in which such affection is seated. The system will much more readily sympathize with an abscess or other disease of a vital organ, such as the lungs, heart, liver, stomach, intestines, mesenteric glands, or kidneys, than with a similar disorder existing in the muscular or cellular tissue near the surface of the body. Diseases of parts of which the powers of reparation are feeble, and which consequently, when diseased, keep up a protracted irritation in the system, often give rise to hectic. Hence we frequently observe it as a consequence of diseases of bone, ligaments, and tendons, and of abscesses connected with diseases of these tissues, such as psoas abscesses and those produced by diseased joints. If the nature of the local affection is such as the powers of the constitution have little or no controul over; if, for instance, it is scrofulous, cancerous, rachitic, and particularly if it is tubercular, hectic very generally arises; and likewise, on the same principle, it is not unfrequently produced by a

* Hunter on the Blood, vol. ii. p. 377. London, 1812.

long-continued mechanical irritation, as that of a calculus in the kidneys or bladder, or of a foreign body in the trachea, (of which a case is related by Borelli,) and on the removal of the irritating cause it occasionally ceases.

Mr. Hunter was of opinion that hectic might be an original disease of the constitution independent of any local cause; and Dr. Willan, Dr. Perceval of Dublin,* Trnka, and some others have expressed the same sentiment; but it is by no means a general one. Mr. Hunter guards his opinion by a qualification, for he states that the constitution may fall into this mode of action without any local cause "*that we know of*;" and on examining the evidence on the subject, we are led to conclude that this qualification explains the existence of a sentiment in this author and others so little in accordance with that of the profession generally, and that the imperfection of diagnosis alone has led to the supposition that this may be an idiopathic disease. We are told, for instance, that hectic may exist without pulmonary affection for three months, and then break out in the lungs.† From the extreme difficulty of detecting the presence of tubercles in their unsoftened state, even with the improved methods of diagnosis now employed, is it not reasonable to conclude that these bodies had existed in the lungs undetected, and produced the fever; since we find this affection, which of all is most frequently attended with hectic, ultimately displaying itself by manifest signs? The writer saw some years ago a case of apparently idiopathic hectic which proved fatal; an examination of the body showed the existence of small abscesses in the muscular substance of the heart; and we believe that in other instances, what is supposed to be primary hectic is equally the sign of an undiscovered local irritation or lesion. A fever in all respects resembling hectic supervenes on profuse hemorrhages; but this will not be found on consideration to form an exception to the general rule. The system is left by hemorrhage in a state favourable to the production of this form of disease on the application of any irritating cause, and the nutriment given to recruit the strength of the patient, acting on the enfeebled alimentary canal, becomes such a cause, for hectic will ever be found most apt to occur in such cases where a stimulating regimen is employed.

Treatment.—On this branch of the subject we have little that is satisfactory to communicate. If the local cause is of a nature to admit of correction, or if irremediable, so situated that it can be removed, the accomplishment of one or the other should be attempted; but in the majority of instances neither is practicable. The constitutional treatment is principally restricted to regulating the bowels by gentle laxatives when the patient is costive, or by opiates and astringents when diarrhœa exists.

The diet should be light and nutritious; and a pure and moderately warm air should be selected for the patient when circumstances render it attainable. Tepid, or even cold ablutio, or sponging during the height of the febrile exacerbation, is refreshing, and tends to diminish the colliquative perspirations. Tonics have been recommended, and sulphuric acid is as eligible as any medicine of this class; but they do not merit much confidence. Besides the use of opiates to check diarrhœa, they may be employed to allay irritation and procure sleep.

(Joseph Brown.)

FEVER, PUERPERAL. This term was first employed by Dr. Strother, in the year 1716, to designate the most fatal inflammatory disease to which child-bed women are liable. The name is now generally employed by medical writers, and it is considered to be synonymous with the terms puerperal peritonitis, child-bed fever, puerperal fever, or the epidemic disease of lying-in women.

The records of medicine afford indubitable evidence of the fact, that puerperal or child-bed women have, from the most remote periods of antiquity, been liable to attacks of this destructive affection. In the works, however, of the earlier authors its history is short and imperfect; and it is probable that the disease did not attract the particular attention of physicians before the middle of the seventeenth century, when it occurred at Paris as a malignant epidemic in the lying-in wards of the Hôtel Dieu. Since that period it has often been observed in the principal cities and lying-in hospitals of Europe, both in a sporadic and epidemic form.

The most vague and contradictory opinions have hitherto prevailed respecting the nature and treatment of this disease. Inflammation of the peritoneum, omentum, or some of the abdominal viscera, has been considered as the cause of all the phenomena; and for the treatment, copious bloodletting and cathartics have been recommended. Other writers, who refer all the local and constitutional symptoms to a specific fever, peculiar to women in the puerperal state, deprecate the employment of venesection, and urge the necessity of employing the most powerful stimulants and cordials. The morbid sensibility of the hypogastrium, usually observed at the commencement of the attack, and the changes of structure from inflammation often discovered after death, both in the uterine and other organs, they have considered as the consequences of this idiopathic fever, in like manner as inflammation of the brain, lungs, or intestines, often supervenes in the progress of typhus.

Those who have most attentively perused the works of Hulme, Leake, Denman, Walsh, Gordon, Joseph and John Clarke, Hamilton, Hey, Armstrong, Douglas, Mackintosh, and Campbell, must have been convinced that the pathology of puerperal fever required a more complete investigation than had been made by

* Note on Good's Study of Medicine, first edit. vol. ii. p. 167.

† Mason Good, loc. cit.

any one of these distinguished authors. To reconcile their discordant statements with respect to the nature and treatment of the affection, it appeared requisite that it should be examined not only in hospitals, but also in private practice, for several successive years, throughout all the different seasons. In this manner only did it seem possible to ascertain whether they had described diseases essentially distinct, or merely varieties of the same affection, modified by some powerful but unknown causes.

From the 1st of January, 1827, to the 1st of June, 1832, one hundred and sixty-two cases of well-marked puerperal fever came under our immediate observation in private practice, and in the British Lying-in Hospital, and other institutions in the western districts of London. We watched the symptoms and progress of these cases with the closest attention, observed the effects of the different remedies employed, and, where death took place, we carefully examined the alterations of structure in the uterine and other organs.

Of fifty-six cases which proved fatal, the bodies of forty-four were examined, and in all there was found some morbid change, the effect of inflammation, either in the peritoneal coat of the uterus, or uterine appendages, in the muscular tissue, in the veins, or in the absorbents of the uterus, which accounted in a most satisfactory manner for all the constitutional disturbance which had been observed during life. The peritoneum and uterine appendages were found inflamed in thirty-two cases; in twenty-four cases there was uterine phlebitis; in ten there was inflammation and softening of the muscular tissue of the uterus, and in four the absorbents were filled with pus. These observations are subversive of the general opinion now prevalent in Europe and America, that there is a specific, essential, or idiopathic fever, which attacks puerperal women, and which may arise independent of any local affection in the uterine organs, and even prove fatal without leaving any perceptible change in the organization of any of their different textures. As the constitutional symptoms thus appear invariably to derive their origin from a local cause, it would be more philosophical, and more consistent with the correct principles of nosological arrangement, to banish entirely from medical nomenclature the terms *puerperal* and *child-bed fever*, and to substitute in their place that of *uterine inflammation, or inflammation of the uterus and its appendages in puerperal women*. The terms *puerperal peritonitis* and *peritoneal fever*, employed by some English and foreign physicians, are not less objectionable than *puerperal fever*, for in many of the fatal cases there is no proof whatever of the existence of any affection of the peritoneum.

All writers agree that in puerperal fever there is exquisite sensibility of the abdomen with pyrexia, and that these are the only invariable and characteristic symptoms of the disease. After the inflammatory symptoms of the uterine

organs subside, those of collapse follow, as in the last stages of inflammation of the brain, lungs, liver, intestines, and other abdominal viscera: then the belly becomes distended and tympanitic; and after death extensive alterations of structure remain in the uterus and its appendages; while the other important external and internal organs present no morbid appearance. Besides there is nothing which can be discovered in the condition of a puerperal woman to render her more liable to attacks of typhous fever than any other individuals; and lying-in women, as we had an opportunity of observing in the epidemic typhus of Edinburgh in the years 1816 and 1817, and during the last five years in this metropolis, are rarely affected with common typhus. It is to the uterus, which is left in a condition after delivery to which no other organ of the body is ever similarly placed, and which renders it peculiarly liable to attacks of inflammation, that we are to look for an explanation of all the phenomena of puerperal fever.

Until a recent period, the pathological anatomy of the uterine organs in puerperal women had not received that due attention which its importance demanded. In the histories of the different epidemic fevers which have prevailed amongst lying-in women since the middle of the seventeenth century, the symptoms and the morbid appearances, though imperfectly described, nevertheless strongly confirm the accuracy of the conclusion, that the whole phenomena, local and general, of these fevers, are to be referred to inflammation of the uterine organs; and that the symptoms vary according as the superficial or the deeper-seated structures of the uterus are affected.

It is stated by Peu, that in 1664 a prodigious number of puerperal women perished in the Hôtel Dieu, and that the cause of this mortality was attributed by M. Vesou, physician to the hospital, to the circumstance of the lying-in wards being situated immediately over those set apart for the reception of individuals who had been wounded. The women were attacked with hemorrhages, and on opening their bodies they were found to be full of abscesses.*

This brief and imperfect account of the disease when first observed as an epidemic, is interesting from this circumstance, that no further notice is taken of it by the French writers during the succeeding hundred and twenty-two years, for the whole of which period the lying-in wards of the Hôtel Dieu remained contiguous to the wards of the sick and wounded. It is not distinctly stated by Vesou whether it was in the uterus, or in the viscera of the thorax, head, or abdomen, that abscesses were observed on dissection; but it will hereafter appear that the presence of abscesses in any part of the body of a woman who has recently been delivered is one of the strongest proofs which can be obtained of the previous

* Peu, *Pratique des Accouchemens*, p. 268.

existence of inflammation in the deeper-seated textures of the uterine organs.

The winter of 1746 at Paris was most destructive to puerperal women, and they died between the fifth and the seventeenth day after their confinement. The epidemic attacked the indigent, but much less frequently those delivered at their own habitations than in the Hôtel Dieu. Of twenty women in child-bed affected with the disease in February of that year in the Hôtel Dieu, scarcely one recovered.*

M. Malouin has given the following history of the symptoms and progress of this epidemic. "The disease usually commenced with a diarrhoea, the uterus became dry, hard, and painful; it was swollen, and the lochia had not their ordinary course; then the women experienced pain in the bowels, particularly in the situation of the broad ligaments; the abdomen was tense; and to all these symptoms were sometimes joined pain of the head, and sometimes cough. On the third and fourth day after delivery the mammae became flaccid. On opening the bodies curdled milk was found on the surface of the intestines, a milky serous fluid in the hypogastrium, a similar fluid was found in the thorax of certain women, and when the lungs were divided they discharged a milky or putrid lymph. The stomach, the intestines, the uterus, when carefully examined, appeared to have been inflamed. According to the report of the physicians, there escaped clots on opening the vessels of this organ."

"This terrible disease," says M. Tenon, "has shewn itself at different epochs, and its returns have been more frequent than ever; it reappeared every winter from 1774; it commenced usually about the middle of November, and continued till the end of January. It is met with also at the other seasons of the year, even during spring, for it has come to prevail more and more, and to be as it were naturalized.†

"Those who were attacked in the years 1774 and 1775 died between the fourth and seventh days after delivery, and seven out of every twelve women who were delivered were seized with the disease. Two distinct forms of it were successively observed, one a simple form, which was cured by ipecacuan; the other a complicated form, for which there was no remedy; so that there perished in 1816, one of every seven of those who were attacked with puerperal fever, and death took place from the sixth to the eighth day after delivery, and often much earlier.

"The first symptoms manifest themselves twenty-four, thirty-six, or forty-eight hours after delivery, and sometimes, but rarely, in the space of twelve hours: The symptoms of the simple puerperal fever are developed in the following order; rigor, slight pain in the region

of the kidneys, intestinal colic, which in two hours affects the whole hypogastrium, and gradually becomes more acute. Pulse concentrated, fever moderate, lochia not suppressed; mammae flaccid, tongue dry in the middle, covered with a yellow mucus on the edges; hiccup, and vomiting of green-coloured matters. There was sometimes combined with these constant and characteristic symptoms of the disease which took place in the years 1774 and 1775, a diarrhoea of a bilious glairy matter, a considerable swelling of the hypogastrium, thirst, and remarkable retention of urine.

"In the complicated puerperal fever, the pyrexia is stronger, with exacerbations; the tongue is black and dry, the belly is tense, distended and tympanitic, and slightly painful. In some women the lochia have been either wholly suppressed or only diminished, others have experienced attacks of ophthalmia; in some the respiration was difficult; in general the blood shewed the buffy coat.

"On opening the abdomen, the stomach, the intestines, particularly the small intestines, were inflamed, adhering to one another, distended, filled with air and a yellow fluid matter. The uterus was contracted to its ordinary dimensions, and was seldom found inflamed. I had occasion to dissect two; in one the uterus contained a coagulum of blood; an infiltration of a milky appearance or whey-like fluid existed in certain women in the cellular membrane which surrounds the kidneys. Sometimes, also, a thick, white, cheesy matter was met with. When the lungs were gorged with blood, or inflamed or emphysematous, an effusion of serum was found in each side of the chest. We did not observe the hemorrhages which occurred in the epidemic of 1664, and the uterus was not found dry, hard, and tumefied as in that of 1746. In the epidemic of 1774, the lochia flowed, but they did not flow in 1746."

From 1782 to the present time, the same fatal disorder has appeared at different times in the Maternité at Paris, and in many of the continental lying-in hospitals, and the same morbid appearances have been observed on dissection.

The bodies of fifty-six women were examined who had died of puerperal fever in the general hospital at Vienna, in the autumn of 1819, and in all of these, with the exception of two, where delivery had taken place a considerable time previous to death, effusions of sero-purulent fluid were found in the abdominal cavity, and traces of inflammation in one or more of the abdominal viscera. The ovaria and fallopian tubes were always more or less swollen, red, and tender, and the body of the uterus was, in consequence of inflammation, flabby, tender, and easily broken down with the finger. It is also stated in the report of this epidemic, that the accession of fever is always preceded by marked changes in the whole system, particularly in the uterus, clearly indicating an inflammatory state. The symptoms indeed were such, that the inflam-

* *Mémoires de l'Académie des Sciences pour l'année 1746.*

† *Mémoires sur les Hôpitaux de Paris*, p. 243.

mation combined with high fever could not be mistaken.*

Pinel, Bichat, Laroche, and Gardien found the peritoneum inflamed in so many fatal cases of puerperal fever, that they have considered this disease essentially to depend on inflammation of the peritoneum. A French author, who has subsequently observed the disease, and who entertains the same views of its nature, asserts that nothing can be more absurd, more chimerical, or more contrary to the spirit of analysis and observation, than the idea that there is a fever essential or peculiar to women recently delivered.

If we consult the works of the most celebrated writers in this country on puerperal fever, it will clearly appear that they all describe the disease as commencing with a sense of soreness or exquisite tenderness in the region of the uterus; and that where it proves fatal, the appearances on dissection are such as afford unequivocal proofs of inflammation of one or more of the pelvic and abdominal viscera.

Strother, Burton, Millar, and Wallace Johnson, state that the distinguishing marks of the disease are pain of the hypogastric region, abdomen, and loins, and that relief often follows venesection.

Drs. Hulme and Leake considered inflammation of the omentum to be the proximate cause of puerperal fever, and the latter suspected that the whole mass of circulating blood becomes contaminated by absorption of the fluids effused into the peritoneal sac. "Considering," observes Dr. Leake, "the suppuration of the omentum, and large quantity of purulent fluid in the abdomen after death, it is easy to see how a secondary fever, which was truly inflammatory at the beginning, may soon become putrid by absorption of that fluid, which, like old leaven, will taint the blood by exciting a putrid ferment in the whole mass, and change its whole qualities into that of its own morbid nature. Some of those who survived recovered very slowly, and were affected with wandering pains and paralytic numbness of the limbs, like that of chronic rheumatism. Some had critical abscesses in the muscular parts of the body, which were a long time in coming to suppuration, and, when broke, discharged a sanious ichor."†

Dr. William Hunter observes, that on examining the bodies of those who have died from puerperal fever, the viscera and every other part of the abdomen are found to be inflamed. There is a quantity of purulent matter in the cavity of the abdomen, and the intestines are all glued together.

Pain of the head and abdomen with fever were the symptoms which Dr. Lowder considered to be pathognomonic of the disease; and redness of the peritoneum, adhesion of the intestines, effusion of serum mingled with pus

and lymph, the most frequent morbid appearances.

The history of the symptoms and morbid changes of structure, by Drs. Joseph Clarke, Gordon, Campbell, Mackintosh, and other writers, is nearly the same; and Professor Hamilton, who believes that puerperal fever is a *fever sui generis*, nevertheless admits that the appearances on dissection are exactly similar to the descriptions generally given by those authors, and that acute pain of the abdomen is a primary and not a secondary symptom of the disease. Dr. Hamilton positively affirms that puerperal fever is a disease of a "putrid" nature, requiring for its treatment, wine, volatile alkali, bark, glysters, and animal jellies; and yet, in direct opposition to these theoretical views, and as if involuntarily led by the symptoms to a correct conclusion respecting the true character of the affection, he has laid down as the first indication of treatment to moderate local inflammation by purging and hot fomentations.

It is a singular circumstance that in none of the works to which we have now referred has the most remote allusion been made to inflammation of the veins, absorbents, or any of the other structures of the uterus, except the peritoneal covering, though several of them have accurately described the constitutional symptoms which characterise these morbid states.

In the epidemic fever which prevailed at Aberdeen between the years 1789 and 1792, Dr. Gordon examined the bodies of three patients who died of the disease, and in each the peritoneum and uterine appendages were inflamed. "The omentum," he observes, "does not appear to be more especially affected than the other productions of the peritoneum, which are all equally and indiscriminately affected. The dissections which I have made, prove that the puerperal fever is a disease which principally affects the peritoneum and its productions, and the ovary. The peritoneum was inflamed, and the omentum, mesentery, and peritoneal coat of the intestines were all promiscuously affected." Venesection and cathartics were found to be the most powerful remedies.*

Dr. J. Clarke admits that in most cases of the true puerperal fever there has been some degree of inflammation in the cavity of the abdomen, and that the uterus and ovary sometimes partake of the inflammation. In two cases which he met with, there was an appearance of pus in the veins of the uterus. The brain was always in a natural state. In one instance only was there an appearance of disease in the chest. The effusion of sero-purulent fluid into the sac of the peritoneum was so disproportioned, however, to the degree of inflammation, that he supposed it to have arisen from another cause. Pathologists now admit that these copious effusions into the peritoneal sac are invariably the result of acute inflammation, and not of any peculiar disposition

* Medical Annals of the Austrian States, 1822.

† Leake on Child-bed Fever, &c. vol. ii. pages 90-92.

* Treatise on the Epidemic Puerperal Fever, 1795.

of the vessels of the part, as Dr. Clarke had supposed.*

The works of Dr. Armstrong and Mr. Hey contain the histories of two epidemics, in which the leading symptoms were those which are present in cases of abdominal inflammation, and the employment of copious bloodletting, cathartics, and other antiphlogistic remedies, was attended with decided advantage. The actual condition of the uterine and other organs was not, however, ascertained by either of these writers, as they were not permitted to examine the bodies of any of those who were cut off with the disease.

The more recent works of Drs. Campbell and Mackintosh may also both be referred to, in confirmation of the truth of the pathological doctrines we shall endeavour to establish; and the statements of Dr. Gooch, if carefully examined, will be found to support rather than to weaken the force of our conclusions. As a substitute for the ordinary names, child-bed fever, puerperal fever, and peritonitis, he has employed the term peritoneal fever "to express the fact that an affection of the peritoneum is an essential accompaniment of the disease, without defining what that affection is, because it is not uniform." This term, peritoneal fever, is perhaps the least appropriate of all the terms that Dr. Gooch could have invented; for he admits that the disease may occur in its most exquisite form, and yet leave few or no traces in the peritoneum after death by which we might have been enabled to determine that this membrane had previously been the seat of the disease.

"The most remarkable circumstance," Dr. Gooch observes, "which the experience of the last few years has taught us about peritoneal fevers is, that they may occur in their most malignant and fatal form, and yet leave few or no vestiges in the peritoneum after death. The state of this membrane, indicated by pain and tenderness of the abdomen, with a rapid pulse, appears to be not one uniform state, but one which varies so much in different cases that a scale might be formed of its several varieties; this scale would begin with little more than a nervous affection, often removable by soothing remedies, and, when terminating fatally, leaving no morbid appearances discoverable after death. Next above this, a state in which this nervous affection is combined with some congestion, indicated, in the cases which recover, by the relief afforded by leeches, and in the cases which die, by slight redness in parts of the peritoneum, and a slight effusion of serum, sometimes colourless, sometimes stained with blood. Above this might be placed those cases in which there are in the peritoneum the effusions of inflammation without its redness, namely, a pale peritoneum and no adhesions, lymph like a thin layer of soft custard, and a copious effusion of serum rendered turbid by soft lymph. Lastly, the vestiges of acute in-

flammation of the peritoneum, viz. redness of this membrane, adhesion of its contiguous surfaces, a copious effusion of serum, and large masses of lymph."*

Dr. Gooch affirms that symptoms and dissections cannot settle the question respecting the pathology of puerperal fever. "The effects of remedies on a disease," he says, "if accurately observed, form the most important part of the history. They are like chemical tests, frequently detecting important differences in objects which previously appeared exactly similar. Symptoms and dissections can never do more than suggest probabilities about the nature of a disease and the effects of a remedy on it. A trial of the remedies themselves is the only conclusive proof."

We might appeal to the works of all the most eminent writers on puerperal fever since the middle of the seventeenth century to prove that this opinion is equally erroneous as it is dangerous; and it would be easy to shew, from the contradictory statements of the effects of the various modes of treatment adopted by physicians during the last fifty years, that we must have for ever remained ignorant of the true nature of the disease, if we had reasoned from the effects of remedies alone, without investigating symptoms and morbid changes of structure.

That a diffused pain of the abdomen with a rapid soft pulse not unfrequently occurs at particular seasons, without inflammation of the uterus or of any other part, or with a very slight degree of inflammation, in delicate nervous women after parturition, and that these symptoms are relieved by opiates and warm fomentations, without either general or local bloodletting, will readily be admitted by all who are conversant with the diseases of the puerperal state. That such cases are, however, if not essentially different in their nature, at least widely different in degree of severity from cases of sporadic or epidemic puerperal fever or uterine inflammation, is clearly demonstrated by the following observation made by Dr. Gooch himself: "There seemed to be nothing dangerous in this form of disease, provided the nature of it was not mistaken and improper remedies not used, yet it so strikingly resembled peritoneal inflammation that it was invariably taken for it by the practitioners who witnessed it, all of whom possessed at least that average quantity of sense and knowledge on which the public must extensively depend."

There can be little doubt that in numerous instances the irregular spasmodic contractions of the uterus constituting after-pains, and irritation of the intestines have been mistaken by superficial observers for puerperal fever, but such mistakes do not prove the identity of these affections. The results of the practice in the Westminster Lying-in Hospital in the years 1828 and 1829, referred to by Dr. Gooch, prove beyond contradiction that the cases described

* Essays on the Epidemic Disease of Lying-in Women, by J. Clarke, M.D.

* An account of some of the most important diseases peculiar to women, by Robert Gooch, M.D.

by him under the term peritoneal fever, were not genuine examples of low child-bed fever, as he has maintained; for of twenty-eight women who were attacked with the disease, and most of whom were treated as he had recommended, with Dover's powder and warm cataplasms, seven died, or one in four.

In investigating the morbid anatomy of this class of diseases, Dr. Gooch appears to have been satisfied with simply inspecting the peritoneal covering of the uterus; now we are strongly inclined to believe, from what we have ourselves observed, that if he had carefully examined the spermatic and hypogastric veins, the absorbents, the uterus and its appendages, with the sub-peritoneal tissues, he would frequently have found acute inflammation or some of its products. With the phenomena of inflammation of the deep-seated structures of the uterine organs he appears indeed to have been perfectly unacquainted, as they are not even alluded to in the course of his essay, and are generally confounded with the effects of loss of blood. The absence of increased vascularity of the peritoneum, and of lymph and serum in its sac, does not prove that the subjacent tissues are in a healthy state. That a nervous affection or congestion of the peritoneum should give rise to all the symptoms and consequences of fatal uterine inflammation, is not only highly improbable, but is wholly unsupported by facts. Had Dr. Gooch estimated more correctly the value of pathological anatomy in discovering the nature of disease, and placed less reliance on the uncertain operation of remedies, he could not possibly have fallen into so many important practical errors with respect to puerperal fever, and to some of the organic diseases of the uterine organs in the unimpregnated state.

The recent valuable researches of Andral, Luroth, Dance, Danyau, Tonellè, and Dupley, confirm in a remarkable manner the accuracy of the views we have now stated of the proximate cause of puerperal fever. In the epidemic of 1829 at Paris, numerous opportunities occurred of examining the morbid appearances in those who were cut off by the disease. In one hundred and thirty-two out of two hundred and twenty-two fatal cases, purulent fluid was found in the veins and absorbents of the uterus, and in one hundred and ninety-seven some important alteration of structure was observed in the uterine organs. In a few rare cases described by M. Tonellè under the term ataxic puerperal fever, the changes which had taken place in the uterine organs were comparatively slight, and consisted of an exudation at the neck of the uterus and some lymph effused into the cavities of the uterine veins. In these cases the symptoms were considerably different from those commonly observed in uterine inflammation, and were possibly referable to other causes.

The whole of the preceding statements seem to warrant the following general inference, which we ventured to draw from our own observations in October, 1829: "That inflammation of the uterus and its appendages must be considered as essentially the cause of all

the destructive febrile affections which follow parturition, and that the various forms they assume, inflammatory, congestive, and typhoid, will in a great measure be found to depend on whether the serous, the muscular, or the venous tissue of the organ has become affected."*

We shall now proceed succinctly to describe the various changes produced by inflammation in the uterine organs subsequent to parturition;—to point out the local and constitutional symptoms by which these morbid conditions are characterized during life, and by which they are distinguished from other affections to which they bear a resemblance;—to investigate the causes and nature of this disease;—and to describe the treatment adapted to the different varieties of uterine inflammation, and the most important means to be adopted for its prevention.

The following are the principal varieties of inflammation of the uterus in puerperal women which we have observed.

1. Inflammation of the peritoneal covering of the uterus and of the peritoneal sac.
2. Inflammation of the uterine appendages; ovaria, fallopian tubes, and broad ligaments.
3. Inflammation of the muscular and mucous tissues of the uterus.
4. Inflammation and suppuration of the absorbent vessels and veins of the uterine organs.

These varieties of uterine inflammation may take place quite independently of each other, though they are most frequently met with in combination. Peritonitis seldom occurs without some inflammation of the uterine appendages; but we have found both these textures severely affected while the muscular coat of the uterus and the veins were wholly exempt from disease. The venous and muscular tissues of the uterus are also liable to attacks of severe inflammation without any corresponding affection of their peritoneal covering, though it most frequently happens that inflammation, when excited, either in the veins or muscular coat of the uterus, involves also the peritoneum. In the organs of respiration similar varieties of inflammation are observed, and the pleura, pulmonary texture, and mucous membrane lining the air-passages, may all be separately or simultaneously involved in the same attack. A similar observation may be extended to the brain and its membranes, and to the whole of the digestive organs; and the symptoms which characterize the inflammation of the different tissues of which these organs are composed, have been more accurately determined than formerly by the recent discoveries of pathological observers.

Inflammation of the uterine organs, like inflammation of the lungs and other affections of a similar character which assume an epidemic form, takes place more frequently at one season than another, and at one period the peritoneum is the tissue most commonly affected, whilst at other seasons the deeper-seated tissues are almost invariably found in-

* Med. Chir. Transact. vol. xv. part ii. p. 405, 1829.

flamed. That there is no essential difference between these varieties of uterine inflammation is proved by the circumstance that in the course of a few days, in the same ward of the British Lying-in Hospital, and in patients who were placed in contiguous beds during the prevalence of the epidemic, when the disease appeared to be communicable from person to person, peritoneal inflammation, uterine phlebitis, and the other varieties above enumerated, all occurred in their most marked or characteristic form. In some patients the local and constitutional symptoms indicated the presence of acute inflammation of the serous covering of the uterus; and in those cases where active depletion was had recourse to at the commencement of the attack, most frequently a speedy recovery took place. In other examples, at the onset of the disease, there was comparatively little pain in the region of the uterus, the pulse was from the beginning rapid and feeble, and the symptoms were such as to contraindicate the use of bloodletting and cathartics. Such cases usually terminated fatally in defiance of local bleeding and the exhibition of mercury and opium, and other remedies; and on examination after death, either the veins, the muscular structure, or the appendages of the uterus were found to be the textures most frequently inflamed.

These facts prove that at different seasons, different textures of the uterine organs are liable each to be affected with inflammation in varying degrees of intensity, and they enable us in some measure to reconcile the discordant opinions already quoted, both with respect to the symptoms and the treatment of puerperal fever.

1. *Puerperal peritonitis.*

Morbid appearances.—The peritoneum when inflamed becomes vascular, red, and apparently thickened, and the abdominal viscera adhere to one another by an effusion of lymph, or there is an effusion of a turbid serous fluid mixed with shreds of albumen or pus, sometimes tinged with blood, in greater or smaller quantity, into the cavity of the peritoneum. The omentum is often of a deep red colour, highly vascular, and closely adherent to the intestines, and sometimes to the fundus of the uterus, by lymph. The intestinal canal is frequently found much distended with air, at other times the sac of the peritoneum.

Puerperal peritonitis commences in the peritoneal covering of the uterus, and extends from thence with greater or less rapidity, according to the severity of the attack, to the whole peritoneum. In some cases the inflammation is confined to the uterus, and it is generally most severe in this situation, or in the parts immediately surrounding that organ. Even when it has extended to the other viscera, and affected them most severely, the peritoneum of the uterus invariably exhibits signs of recent inflammation. The lymph is for the most part thrown out in thicker masses upon the uterus than in any other situation, and this viscus seems always to suffer in the greatest degree. In the cellular membrane under the

peritoneum, serum and pus are also not unfrequently found deposited.

Symptoms.—Great tenderness of the hypogastrium increased by pressure, with pyrexia, are the characteristic symptoms of the disease. In every instance which has fallen under our observation, we have found the uterine region more or less painful on pressure, and there has been febrile disturbance.

When the attack is violent, the patient generally lies upon the back, with the knees drawn up to the trunk of the body. The abdomen at first is soft and flaccid, and, except in the region of the uterus, is frequently not affected by pressure. Though an enlarged and painful state of the uterus is never altogether wanting, yet the pain often undergoes exacerbations similar to after-pains, and is frequently mistaken for these by careless observers; and the true character of the disease is overlooked until a great part of the peritoneal sac is absolutely inflamed. The whole abdomen then becomes swollen and tympanitic, and the pain either wholly subsides or becomes still more intense than at the commencement. Vomiting of black or dark green coloured fluids follows, the pulse grows extremely rapid and feeble, the tongue dry and brown, the lips and teeth are covered with sordes, and death follows at no very remote period.

The manner in which the disease commences varies considerably in different individuals. The invasion of pain is sometimes sudden, at other times the ordinary increased sensibility of the uterus which remains after natural labour or after-pains, passes insensibly into the acute pain, increased by pressure, which is the chief pathognomonic symptom of this affection. Most frequently the accession of the disease is marked by rigors, partial or general, sometimes so slight as almost to escape notice, at other times so violent as to produce severe shivering of the whole body. The cold stage, after a longer or shorter duration, passes away, and is succeeded by heat of skin, suffusion of the countenance, acceleration of the pulse and quick respiration, thirst, frequently nausea or vomiting, and intense pain across the forehead. Cough is also a common symptom of the disease. The rigors precede, accompany, or follow the increased sensibility of the uterus. In some of the most severe cases there has been no distinct rigor; but a quick pulse, hot skin, and hurried respiration have rapidly succeeded to the uterine pain. In most of the fatal cases the countenance has from the commencement been anxious and pallid, and the extremities cold.

There is no uniformity to be noticed in the appearance of the tongue in puerperal peritonitis. It is sometimes entirely covered with a thin, moist, white or cream-like film; at other times it is of a deep red or brown colour in the centre, with a thick yellow or white fur on the edges.

The lochia are often entirely suppressed; in other cases only diminished in quantity. The mammae usually become flaccid; yet in

some fatal cases the milk has been secreted until a short period before death.

This variety of uterine inflammation is frequently confounded with deranged states of the intestinal canal, the irregular spasmodic contractions of the uterus which constitute after-pains, hystericalgia, and simple suppression of the lochial discharge.

In cases of intestinal irritation, (or intestinal fever as it has been named by Professor Burns, and by Dr. Marshall Hall a serious morbid affection after delivery,) the pain is from the commencement of the attack diffused over the whole abdomen; it is a gripping rather than acute pain, does not commence in the region of the uterus, and is but little, if at all, aggravated by pressure. The abdomen is generally soft, puffy, and distended. The tongue is loaded; there is thirst and headach; neither the lochia nor the secretion of milk are suppressed. The febrile attack is usually preceded by evident signs of derangement of the bowels, such as flatulence, nausea, vomiting, constipation, or diarrhoea. Puerperal peritonitis is developed in a large proportion of cases before the end of the fourth day after delivery, whereas this affection of the bowels rarely appears until the end of the first week.

It is difficult in some cases to distinguish inflammation of the peritoneum from after-pains and hystericalgia. Where the pulse is accelerated, the remission of pain incomplete, the lochia scanty or suppressed, and the hypogastrium tender on pressure, we shall arrive at a correct diagnosis by considering the peritoneal coat of the uterus in a state of congestion and inflammation, and employing antiphlogistic treatment. There are few puerperal women, except those of a feeble and irritable constitution, or who have been previously exhausted by profuse hemorrhage, or some chronic disease, who are seriously injured by cautious depletion, local or general; and where death has followed the abstraction of sixteen or twenty ounces of blood from the arm, the fatal result may fairly be attributed to disease, and to the neglect of the remedy rather than to its abuse. In cases of intestinal irritation we have often found the local abstraction of blood followed by decided relief; and the same holds true with respect to the severe irregular uterine pains without inflammation which often occur subsequently to delivery, and do not yield to the ordinary means of treatment.

2. *Inflammation of the uterine appendages, ovary, fallopian tubes, and broad ligaments.*

We have met with one case only where the peritoneal covering of the uterus has been inflamed whilst the uterine appendages have remained free from disease, but frequently the peritoneum has been observed slightly affected, when the appendages of the uterus have been extensively disorganized. The surface of the broad ligaments, ovary, and fallopian tubes, when inflamed, have been found red and vascular, and partially or completely imbedded in lymph and pus. The loose extremities of the fallopian tubes have also been found of a deep red colour and softened, and deposits

of pus, in a diffused or circumscribed form, have taken place within these cavities, or in their sub-peritoneal tissues. Between the folds of the broad ligaments, effusions of serous or purulent fluids have also been noticed. Numerous important changes have likewise been observed in the structure of the ovary. Their peritoneal surface has often been seen red, vascular, and imbedded in lymph, without any visible alteration of their parenchymatous structure, or their whole volume has been greatly enlarged, swollen, red, and pulpy; blood has been effused into the vesicles of De Graaf or around them, and circumscribed deposits of pus have been found dispersed throughout the substance of the enlarged ovary. In several cases which have come under our observation, the entire structure of the ovary has been reduced to a vascular pulp, all traces of their natural organization being imperceptible.

The ovary appeared in one instance which we observed to be converted into a large purulent cyst, which had contracted adhesions with the abdominal parietes, and discharged its contents exteriorly through an ulcerated opening. In another case which proved fatal, the inflamed uterine appendages, agglutinated together by lymph, had contracted adhesions with the peritoneum at the brim of the pelvis, the inflammation having extended to the cellular membrane exterior to the peritoneum, and given rise to an extensive purulent deposit in the course of the psoas and iliacus internus muscles, as takes place in lumbar abscess.

In three other individuals, who ultimately recovered, the purulent matter formed along the brim of the pelvis made its way under Poupert's ligament to the top of the thigh, and escaped through an opening formed in that region. In all of these cases contraction of the thigh on the trunk took place, which remained for several months, but disappeared after recovery. The observations of MM. Husson and Dance prove that this is a frequent and often fatal termination of inflammation of the peritoneal coat of the uterus and its appendages.* In a woman who had a severe attack of inflammation of the right uterine appendages, a few days after delivery, the uterus remained low down in the pelvis, and was immovably fixed to the right side by extensive adhesions.

Inflammation of the uterine appendages being generally combined with peritonitis to a greater or less extent, it is often difficult to establish a diagnosis between these varieties of uterine inflammation. The pain is generally less acute than in peritonitis, and is principally seated in one or other of the iliac fossæ, extending from them to the loins, anus, and thighs. On pressure, the morbid sensibility will be found to exist chiefly in the lateral parts of the hypogastrium. The constitutional symptoms at the onset of the attack do not materially differ from those which mark the

* *Répertoire Générale d'Anatomie, &c. Paris, 1827, tom. iv. p. 74.*

accession of peritonitis, being often accompanied with strong febrile reaction, which passes speedily away, and is succeeded by prostration of strength and the other changes which characterize inflammation of the muscular and mucous tissues of the uterus.

3. *Inflammation and softening of the muscular and internal coats of the uterus.*

In two cases observed by us, the lining membrane of the uterus had become soft, flocculent, and completely disorganized, like the mucous coat of the stomach and intestines in certain inflammatory diseases. In other cases not only has the internal coat been inflamed, but the muscular tissue, to a considerable depth, or even through its entire substance, has been of a dark purple, greyish, or yellowish hue, and so softened in texture as to be torn by the gentlest efforts made in removing the parts from the body.

The peritoneum covering the inflamed portion of the muscular coat of the uterus has also been affected, and lymph has been thrown out over its surface as in simple peritonitis, or the peritoneum has become of a yellow, red, or livid colour, where no albumen has been deposited on its surface. The peritoneum has also been softened where the subjacent muscular tissue has been little affected, though more frequently there has been extensive disorganization of this latter tissue without a corresponding lesion of the peritoneum. In some cases the inflammation has affected the greater part of the muscular structure of the organ; in others it has affected only the cervix of the uterus, or the part where the placenta had adhered, and the natural appearance of the muscular fibre has been lost. In other instances deposits of pus have been observed, either immediately under the peritoneum or between the fibres of the proper tissue of the uterus.

In the different works on puerperal fever published in this country, this rapid and fatal variety of uterine inflammation has scarcely been noticed, though it has been accurately described by several German and French pathologists. Astruc, Vigarou, and Primrose state that the uterus is liable to be attacked with gangrene and sphacelus; and other authors, particularly Pouteau and Gastellier, have recorded cases where gangrene of the uterus followed acute inflammation of the organ. Boër* has described this affection under the term "putrescence" of the uterus, and has observed its frequent occurrence in particular epidemics. Luroth† and Danyau‡ have more recently published detailed accounts of this destructive disease. Among the two hundred and twenty-two fatal cases of puerperal fever observed by M. Tonellè in the Maternité at Paris in 1829, there were forty-nine in which the muscular tissue of the uterus was found softened. M. Tonellè states that "softening of the uterus," after shewing itself frequently

in the first half of the year 1829, and particularly about January, disappeared entirely in the months of July and August, which were characterized in a remarkable manner by the frequency of uterine phlebitis. Afterwards it began to rage anew with great violence in September and October, and again disappeared in the last two months, during which time the mortality was inconsiderable.

That the destruction of the healthy organization of the proper and internal tissues of the uterus which we have described, is the consequence of an inflammatory process, and not of any peculiar specific action, as some pathologists have maintained, may be inferred not only from the symptoms which accompany the disease, and from the usual effects of inflammation of muscular tissue in other parts of the body, but from the frequent occurrence of this affection in combination with peritonitis, and the other varieties of uterine inflammation.

Pain of the hypogastrium, diminution or suppression of the lochial discharge, and rigors with rapid feeble pulse, are the most frequent symptoms of the disease. The countenance becomes pallid, and expressive of great anxiety and distress. There are often severe headach and delirium, and other symptoms of cerebral disturbance. The skin is hot and dry, and sometimes of a peculiar sallow tinge; the respiration hurried, with great prostration of strength. The tongue soon becomes foul, the lips covered with dark sordes, and occasional nausea and vomiting are experienced. The disease sometimes runs its course with great rapidity; at other times it does not terminate fatally before the end of the second week.

The diagnosis of this variety of uterine inflammation, particularly where it is complicated with peritonitis or phlebitis, which is frequently the case, is extremely difficult. The prostration of strength, the alteration of the features, which often exist from the commencement, the feebleness and rapidity of the pulse, the irregular fetid state of the lochia, are not such constant symptoms as to be considered pathognomonic, and they may arise from other causes. The most attentive consideration of the phenomena will only lead to a probability, not to a certainty as to the nature of the affection; and sometimes its existence cannot be determined during life. In all the cases of this affection which we have observed, the resources of nature and of art have proved equally unavailing in arresting its fatal course. The active inflammatory symptoms, which have usually manifested themselves at the commencement of the attack, have passed speedily away, whatever plan of treatment has been adopted, and have been rapidly succeeded by symptoms of exhaustion. Where the disease has not been complicated with inflammation of the other tissues of the uterus, the symptoms have not been such as to indicate the necessity for the employment of venesection; and in one case where a considerable quantity of blood was abstracted from the system, death soon followed. In other cases where an op-

* Natural. Medicin. Obstet. lib. viii. Vienna, 1812.

† Répertoire Générale d'Anatomie, tom. v. p. 1.

‡ Archives Générales de Médecine, 1830.

posite plan of treatment was had recourse to, the fatal result seemed to be less speedy, though equally certain.

4. *Inflammation and suppuration of the absorbent vessels and veins of the uterus.*

It does not appear that any pathologist in this country had observed a case of inflamed absorbents of the uterus before the month of July, 1829, when a fatal example of this disease occurred in St. George's Hospital. A woman aged 30, in an advanced stage of pregnancy, was admitted into that hospital under the care of Mr. C. Hawkins, July the 1st, in consequence of sloughing of the skin over a diseased bursa of the patella. The removal of the bursa by an operation was followed by great constitutional disturbance, and on the 14th labour came on. Two days afterward, symptoms of uterine inflammation made their appearance, and on the 18th day death took place. The pain was relieved by bleeding, but she never rallied after the attack. On examination of the body some puriform lymph was found in the pelvis, but with no increase of vascularity in the peritoneum. In the broad ligaments some fluid was also effused, and on each side numerous large absorbent vessels were discovered passing up with the spermatic vessels to the receptacle of the chyle, which was unusually distended. All these vessels, and the reservoir itself, were quite filled with fluid pus; but that in the receptacle was mixed with lymph, so as to be more solid: the vessels themselves were firmer and thicker than usual. The thoracic duct above this part was quite healthy. The uterus was scarcely contracted, and the internal surface of the lower half was soft and shreddy, and in a state of slough. The upper part, where no pus was found externally, was also healthy, or nearly so, on its inner surface.*

Since the occurrence of the preceding fatal example of inflamed absorbents of the uterus, four similar cases have fallen under our observation, the histories of which are related in the paper on uterine inflammation in puerperal women.†

In the magnificent collection of pathological drawings at the London University, there are several in which Professor Carswell has represented the appearances which he observed in cases of inflammation and suppuration of the absorbents in the vicinity of the uterus, of the receptaculum chyli and thoracic duct. These beautiful drawings were made by Professor Carswell in Paris, and it has been proved by the researches of Tonellé and Dupley, that inflammation of the absorbents of the uterus, of the receptaculum chyli, and thoracic duct, occurs not unfrequently in puerperal women, and that it gives rise to the same constitutional disturbance as uterine phlebitis. It appears indeed that these varieties of uterine inflammation are frequently combined; and it is probable that in both the purulent fluid is conveyed by the absorbents and veins into the mass of blood circulating in the arteries and veins of the body.

The local symptoms of this affection are often so obscure as to escape detection during life, while the constitutional symptoms, which often resemble in a striking manner the effects produced by the introduction of specific poisons into the body, are so violent as to yield to no remedies, however early and vigorously employed.

Inflammation of the veins of the uterus.

Uterine phlebitis.—Inflammation of the venous system, although known to the older writers, was first fully described by Mr. J. Hunter in the first volume of the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge. The presence of purulent fluid in the veins of the uterus subsequent to parturition, was observed soon after the publication of that essay by Mr. Wilson and Dr. J. Clarke, and Meckel, but none of these authors were aware of the important fact which has recently been illustrated by numerous observations, that a large proportion of the cases termed "low childbed fever," or "typhoid puerperal fever," arise from inflammation and formation of purulent matter in the uterine veins. Twenty-four examples of this most insidious and fatal disease have fallen under our own observation since the autumn of 1827, and from an examination of all these cases, and of those related by foreign authors, it appears that the symptoms of uterine phlebitis correspond in a striking manner with the symptoms assigned by the earlier writers to the "putrid puerperal fever," or "malignant forms of typhus" which occurs after delivery.

In women who have enjoyed good health during pregnancy, and in whom the process of parturition has been easily accomplished, uterine phlebitis occasionally commences within twenty-four hours after delivery, with pain, more or less acute, in the region of the uterus, accompanied or followed by a severe rigor, or a succession of rigors, a suppression of the lochial discharge, acceleration of the pulse, cephalalgia, or slight incoherence of intellect, with most distressing sensation of general uneasiness, and sometimes by nausea and vomiting. These symptoms, after a short duration, are succeeded by increased heat of the body, tremors of the muscles of the face and extremities, rapid feeble pulse, anxious and hurried respiration, great thirst, with brown dry tongue, and frequent vomiting of green-coloured matters. The sensorial functions usually become much affected, and there is a state of drowsy stupor or violent delirium and agitation, which is followed by symptoms of extreme exhaustion; the whole surface of the body not unfrequently assumes a deep and peculiar sallow or yellow colour; the abdomen sometimes becomes swollen and tympanitic, and some of the remote organs of the body, such as the lungs, heart, brain, liver, and spleen, or the articulations and cellular membrane of the extremities, suffer disorganization from congestion, or a rapid and destructive inflammation.

There is scarcely an organ of the body which has not been observed to become secondarily affected from suppuration of the uterine veins. The vessels of the brain sometimes become

* Med. Chir. Trans. vol. xv. p. 64.

† Ibid, vol. xvi. 54.

greatly congested, and lymph is effused upon the surface of the pia mater, or serum into the ventricles; portions of the brain have become softened and disorganized, or purulent infiltrations have taken place into the cerebral substance.

In other individuals, whose lungs had previously been healthy, a rapid and destructive inflammation of the pleura has taken place, or portions of the pulmonary texture have become condensed, of a dark red colour, or infiltrated with pus. In three cases, where there had only been obscure pain in the chest during life, with slight cough and dyspnoea, a copious effusion of lymph and serum was found to have taken place into the cavities of the thorax; the pleura was covered with false membranes, and portions of the lung had fallen into a state of complete gangrene. In one individual the pleura had given way by sloughing, and the right side of the chest was distended with air.

In uterine phlebitis, the mucous membrane lining the stomach has also been observed by M. Dance to have been reduced to the state of a diffuent pulp, and the substance of the spleen has been extensively softened and disorganized;* the eyes have also become suddenly affected with destructive inflammation, and the vision has been lost many days before the termination of life. In two cases which came under our care the conjunctiva of both eyes, without much pain, suddenly became intensely red, the cornea opaque and the eyelids much swollen, and under their lining membrane a large serous deposition took place; lymph and pus were also effused into the anterior chamber, and in one the cornea ultimately burst. In a case related by M. Cruveilhier, the nose became black and gangrenous, yet the patient recovered.

Deposits, or infiltrations of pus, of enormous extent, also take place into the cellular membrane, between the muscles of the extremities, and often in the neighbourhood of the joints; the cartilages of the joints themselves become ulcerated, and pus is formed within the capsular ligaments.

In other individuals, who have never been subject to attacks of rheumatism, severe pain is experienced in various parts of the body, more particularly in the joints and extremities, with an exhausting fever.

All these affections appear to have a common origin, and cannot be referred to any other cause than to the morbid condition of the veins of the uterus. The purulent or other secretions, formed by inflammation within the cavities of these vessels, probably produce the whole of the injurious effects now described, by entering the system and contaminating the mass of blood in like manner as poisons do when absorbed into the body.

In some cases, uterine phlebitis commences at a later period after delivery than above described, and in a much more obscure and insidious form, without pain or sense of uneasiness in the region of the uterus, or any other local

symptom by which the affection can be recognized. The uterus may return to the reduced volume it usually assumes after delivery; the lochial discharge may continue; and the inflammation and suppuration of the veins, which have caused the whole of the violent constitutional disturbance and destructive lesions in distant parts of the body, may have been wholly overlooked during life. In many cases which we have witnessed, this error was committed by the medical attendant, and stimulants were liberally administered to obviate the debility supposed to exist in a specific form without any local affection of the uterine organs.

Inflammation of veins rarely takes place in any part of the body where it cannot be referred to a wound or to some specific cause externally applied to the coats of the vessels. In uterine phlebitis the inflammation cannot, it is true, be invariably traced to the orifices of those veins where the placenta adhered to the inner surface of the uterus; yet it scarcely admits of doubt that the frequent occurrence of the disease is the effect of the orifices of these veins being left open after the separation of the placenta, by which a communication is indirectly established between the venous system and the atmospheric air in a manner somewhat analogous to what takes place in amputation and other extensive wounds. Such a condition of the uterine veins, in consequence of the separation of the placenta, must be favourable to the production of inflammation, and inflammation once excited is seldom limited to these orifices, but extends with greater or less rapidity along the continuous membrane of the uterine veins to the spermatic or hypogastric veins, and from thence to the vena cava and its principal branches, which return the blood from the lower extremities.*

The effects of inflammation in the uterine veins are the formation of adventitious membranes on their inner surface, and the deposition of coagula of lymph, or of purulent matter within their cavities.

Coagula of the fibrine of the blood, which often extend a considerable distance into the uterine veins, are formed in the orifices of these vessels after every labour, and are the principal means employed by nature for the permanent suppression of uterine hemorrhage. These may be distinctly perceived for a long period after delivery, and they have a form and colour different from the coagula produced by inflammation. In opening the body of a patient four weeks after confinement, we observed distinct traces of these coagula, partially absorbed, in the muscular substance of the uterus, at the part where the placenta had adhered.

The inflammation may be limited to the veins, but not unfrequently the muscular tissue contiguous to them participates in the inflam-

* Archives Générales de Médecine, tom. 18, 19, 20.

* A paper by the writer of this article on the structure of the human placenta and its connexion with the uterus, was recently published in the Philosophical Transactions, with the object of proving that no vessels pass from the uterus to cells in the placenta, as the Hunters supposed, and consequently that no great bloodvessels are lacerated in labour.

mation, and becomes of a dark red, or blackish brown colour, and of an unusually soft consistence. The peritoneal covering may also be affected, and the usual consequences of puerperal peritonitis then ensue.

The veins which return the blood from the uterus and its appendages may be either wholly or in part inflamed: generally, however, (and this is a circumstance in the history of uterine phlebitis deserving particular attention,) the inflammation attacks the spermatic veins alone, and for the most part the one only on that side of the uterus to which the placenta has been attached; and it may either confine itself to a small portion of the vessel, or extend throughout its whole course from the uterus to the vena cava. The usual consequences of inflammation of veins are then apparent, viz. injection and condensation of the cellular membrane in which they are imbedded, thickening, induration, and contraction of their coats, and the deposition of lymph mixed with pus and coagula of blood within their cavities.

The same is the case with regard to the hypogastric veins, one only being generally affected. These are, however, more rarely affected than the spermatic veins; and this would seem to depend on the latter veins being invariably employed to return the blood from that part of the uterus to which the placenta had been attached.

But inflammation having once begun, it is liable to spread continuously to the veins of the whole uterine system, to those of the ovaria, of the fallopian tubes and broad ligaments. The vena cava itself does not always escape, the inflammation spreading to it from the iliac or from the spermatic veins. This occurrence seldom takes place to a great extent through the medium of the spermatic, the inflammation usually terminating abruptly at the opening of the spermatic into it on the right side, or of the renal on the left. If it pursue, as it sometimes does, the direction of the kidneys, the substance of these organs, as well as their veins, may be involved in the disease.

When the inflammation affects the hypogastric veins, it may extend from these to the iliac and femoral veins, and thus give rise to all the phenomena observed in phlegmasia dolens.*

Uterine phlebitis would appear to result either from the mechanical injury inflicted by protracted labour, from the force required for the extraction of the placenta in uterine hemorrhage, from retained portions of placenta undergoing decomposition in the uterus, and from any of the causes which produce the other varieties of uterine inflammation.

Though a most dangerous disease, uterine phlebitis is not invariably fatal. That it often occurs in puerperal women where it is not suspected to exist during life, is demonstrated by the fact that in the spermatic and hypogastric veins of females advanced in life, calcareous concretions and various kinds of disor-

ganizations have frequently been observed, which must have been the consequence of attacks of acute inflammation at some remote period.

Causes of puerperal fever.—The causes of inflammation in the uterine organs in puerperal women are often involved in great obscurity. In some cases the inflammation is distinctly referable to the injury inflicted upon the uterus by severe, protracted, and instrumental labour, the forcible introduction of the hand into the uterus to rectify the position of the child, exposure to cold and moisture, and various irregularities of diet soon after delivery. But frequently it arises in the most malignant form where none of these causes have been applied, and where we are compelled to refer it to some peculiar noxious constitution of the atmosphere, or to the communication of contagious miasmata.

It is a point of great practical importance to determine how far contagion is to be considered as a cause of the disease. Dr. Hulme maintained that it was not more contagious than pleuritis, nephritis, or any other inflammatory disease. M. Tonellé, who has recorded the history of the most fatal epidemic which has ever occurred in Paris, asserts that the idea of contagion was clearly out of the question there, for in the Maternité the women who were newly delivered had each a separate apartment, and yet were attacked with the disease, while in the sick ward of the hospital no instance of the propagation of puerperal fever ever occurred.

The evidence of M. Dugès against the doctrine of contagion is not less strong, for he states that in numerous instances pregnant women have been placed in the Infirmary, where they were surrounded by cases of peritonitis without imbibing the germ of the disease, and that still more frequently he has seen women newly delivered brought with some other complaint into the infirmaries, who did not contract the reigning malady, notwithstanding the miasmata which surrounded them.

In no instance has he observed a midwife charged with the care of two women at the same time communicate peritonitis from a sick to a healthy individual, as is reported to have happened in London; and never has this inflammation been propagated from patient to patient in the wards set apart for the reception of healthy women.*

In the earlier descriptions, however, of uterine inflammation, it is referred not only to the corrupted atmosphere of hospitals, but also to contagion. In the Dublin Lying-in Hospital, the Edinburgh Infirmary, the General Lying-in Hospital at Vienna, and in most of those in this metropolis, it has raged as an epidemic at different periods with great violence, and has appeared to be propagated by contagion. Dr. Gordon of Aberdeen states that he had unquestionable proof that the cause of the disease was a specific contagion, and not owing to any noxious constitution of the atmosphere.

* *Baudelecque*, sur la péritonite puerpérale: 8vo. Paris, 1830.

* See the article PHLEGMASIA DOLENS.

The disease seized such women only as were visited or delivered by a physician, or taken care of by a nurse, who had previously attended patients affected with the disease. "I had abundant proofs," he observes, "that every person who had been with a patient in the puerperal fever, became charged with an atmosphere of infection, which was communicated to every pregnant woman who happened to come within its sphere."^{*}

Mr. Hey observes, "If the puerperal fever of Leeds was infectious, which by many it was thought to be, it was so in a very inferior degree to that at Aberdeen; for I have known instances of free communication, by the intervention of others, between women in labour or child-bed and those affected with the disease, without any bad consequence. And, on the contrary, in many cases of puerperal fever, no channel whatever was discoverable whereby the disease could have been conveyed."[†]

Dr. Armstrong observed that most of the cases at Sunderland (forty out of forty-three) occurred in the practice of one surgeon and his assistant. "It is hardly possible to prove," says Dr. J. Clarke, "that it is not infectious, but it has also arisen, as far as we can judge, as an original disease where there had been no communication with infected persons."[‡]

It is difficult to reconcile this conflicting evidence and the facts we have observed: though they have led us to adopt the opinion that the disease is sometimes communicable by contagion, yet they have not, perhaps, been sufficiently numerous and of so decisive a character as to dispel every doubt on the subject of its contagious or non-contagious nature. It is but proper to state that it has occurred in many cases in the most destructive form where the idea of contagion could not possibly be entertained.

In the last two weeks of September, 1827, five fatal cases of uterine inflammation came under our observation. All the individuals so attacked had been attended in labour by the same midwife, and no example of a febrile or inflammatory disease of a serious nature occurred during that period among the other patients of the Westminster General Dispensary, who had been attended by the other midwives belonging to the institution.

On the 16th of March, 1831, a medical practitioner, who resides in a populous parish in the outskirts of London, examined the body of a woman who had died a few days after delivery from inflammation of the peritoneal coat of the uterus. On the morning of the 17th of March, he was called to attend a private patient in labour, who was safely delivered on the same day. On the 19th she was attacked with the worst symptoms of uterine phlebitis, severe rigors, great distur-

bance of the cerebral functions, rapid feeble pulse, with acute pain of the hypogastrium, and peculiar sallow colour of the whole surface of the body. She died on the fourth day after the attack, the 22d of March, and between this period and the 6th of April this practitioner attended two other patients, both of whom were attacked with the same disease in a malignant form, and fell victims to it.

On the 30th of March it happened that the same gentleman was summoned to a patient, a robust young woman, seventeen years of age, affected with pleuritis, for which venesection was resorted to with immediate relief. On the 5th of April there was no appearance of inflammation around the puncture, which had been made in the median basilic vein, but there had been pain in the wound during the two preceding days. The inner surface of the arm from the elbow, nearly to the axilla, was now affected with erysipelatous inflammation. Alarming constitutional symptoms had manifested themselves. The pulse 160, the tongue dry; delirium had been observed in the night. On the evening of this day the inflammation had spread into the axilla. The arm was exquisitely painful; but in the vicinity of the wound, which had a healthy appearance, the colour of the skin was natural, and no hardness or pain was felt in the vein above the puncture. On the 6th patches of erysipelatous inflammation had appeared in various parts of the body; on the upper and inner surface of the left arm and in the sole of the left foot, all of which were acutely painful on pressure. The inflammation of the right arm had somewhat subsided. The pulse was 160, the tongue brown, dry, and furred. Restlessness, constant dozing, and incoherence. When roused, she was conscious. The countenance cold; heat of the surface irregular. On the 7th, pulse rapid; countenance anxious; teeth and lips covered with sordes; somnolence and delirium. The left arm above the elbow was acutely painful, and very much swollen. The right was but little painful, and the erysipelas had made no further progress. The patches of erysipelas on the forehead and sole of the foot had disappeared, but there was a slight blush of inflammation on the inner side of the calf of the left leg. The symptoms became aggravated, and she died on Saturday, the 9th of April.

The author of this article examined the body with Mr. Prout on the 11th, and the following morbid appearances were observed.

The wound in the median basilic vein was open, and its cavity was filled with purulent fluid. The coats of this vessel and of the basilic vein were thickened so as to resemble the coats of an artery. The inner surface of these veins was redder than natural, and at the upper part had lost its usual smoothness, but there was no lymph deposited upon it. The mouths of the veins entering the basilic were all closed up with firm coagula of blood or lymph. The cellular membrane along the inner surface of the arm was unusually vascular, and infiltrated with

^{*} A Treatise on the Epidemic Puerperal Fever, by A. Gordon, M.D. London, 1795, p. 64.

[†] A Treatise on the Puerperal Fever, by William Hey, jun. London, 1815, p. 198.

[‡] Dr. J. Clarke on the Epidemic Disease of Lying-in Women, 1787 and 1788.

serum. This infiltration was to a much greater extent along the situation of the erysipelatous inflammation of the left arm; but the veins of this arm were perfectly healthy.

In the autumn of 1829 a physician was present at the examination of the body of a woman who died soon after delivery from inflammation of the peritoneal and muscular tissues of the uterus. He dissected out the uterine organs, and after inspecting them carefully, assisted in sewing up the body. He had scarcely reached home when he was hastily summoned to attend a young lady in her first labour, who was safely delivered. In sixteen hours she was attacked with violent pain in the region of the uterus; unequivocal symptoms of uterine phlebitis soon after shewed themselves, and she narrowly escaped with her life.

In December, 1830, two patients in the British Lying-in Hospital, who had been attended by the same midwife, were both attacked with the disease on the same day, and both died from inflammation of the absorbents and deep-seated tissues of the uterus. Another patient was admitted into the hospital two days after the death of the last of these women, and was examined by the same midwife to ascertain if labour had commenced. The pains were false pains, but she remained from Saturday till the Monday in the expectation that labour would come on. The pains having left her, she returned home, and on the following day was suddenly taken in labour and safely delivered before she could set out for the hospital. She went on favourably for two days, and was then attacked with the worst symptoms of inflammation of the veins of the uterus, and died in thirty-six hours.

The following statement has lately been published by Mr. Robertson, of Manchester, in number 214 of the Medical Gazette, and it goes to support the opinion that puerperal fever is a contagious disease. From December 3d, 1830, to January 4th, 1831, a midwife attended thirty patients for a public charity; sixteen of these were attacked with puerperal fever, and they all ultimately died. In the same month three hundred and eighty women were delivered by midwives for the institution, but none of the other patients suffered in the slightest degree. Mr. Robertson states that these sixteen were all cases of inflammation of the peritoneal surface of the uterus, and that in no instance did he meet with inflammation of the veins of the uterus.

These facts point out the necessity of adopting every precaution to prevent the extension of the disease, by careful and repeated ablution, and changing the clothes after attending patients who are affected with it. They shew also, whether they be considered perfectly conclusive or not as to the communicability of the affection from person to person, that we ought not to expose ourselves beyond what is absolutely necessary in examining the bodies of those who have been cut off by the complaint. When post-mortem examinations are required,

they should be conducted by those who are not engaged in the practice of midwifery. We certainly owe it as a duty to our patients to act as if the contagion always existed.

Whatever conclusion we may arrive at as to the contagious or non-contagious character of the disease usually termed puerperal fever, it cannot affect the view which has now been taken of its proximate cause or essential nature, for the symptoms, morbid appearances, and influence of remedies, all incontrovertibly prove, whatever the nature of the remote cause may be, that it acts by exciting inflammation of the uterine organs.

With regard to the nature of this inflammation, it is difficult to determine whether it be of a common or specific kind. It certainly arises where individuals are not exposed to the ordinary causes of inflammation, and it often reigns as an epidemic, particularly in hospitals; and in this respect it resembles erysipelas, hospital-gangrene, and other specific inflammatory diseases, which are generally supposed to depend on a vitiated state of the atmosphere. Like these diseases, too, it ceases without any assignable cause, perhaps for several years, and then re-appears in the same establishments, and is attended with the same destructive consequences.

Sporadic cases of puerperal fever are met with in all seasons of the year and in all the different ranks of life, and the disease is sometimes not less destructive when occurring in this form than in hospitals during the prevalence of an epidemic.

Pouteau supposed the inflammation of the uterus to be of an erysipelatous nature, and the same opinion was maintained by Dr. Lowder and Drs. Home and Young of Edinburgh, who saw the disease in the lying-in wards of the Royal Infirmary. Dr. Gordon observed erysipelas to prevail extensively at Aberdeen in 1795, but he has not inferred from this circumstance that the peritoneal inflammation which he has so accurately described was of an erysipelatous kind, or different from common abdominal inflammation.

Dr. Abercrombie has lately described several cases of peritonitis which he considered to be allied to erysipelas. The principal pathological character of this affection noticed by him is, that it terminates chiefly by effusion of fluid, without much and often without any of that inflammatory and adhesive character of the disease in its more common form. Pinel, Bayle, Gasc, and Laennec, to whom we are so much indebted for the knowledge we possess of the anatomical characters of inflammation of the peritoneum, have traced no resemblance between the phenomena of puerperal peritonitis and erysipelatous inflammation, and it is still extremely doubtful if serous membranes are liable to attacks of erysipelas. Dr. Hodgkin has stated to us that the appearances after death in puerperal peritonitis do not differ from those observed in ordinary peritonitis in the male sex.

Dr. Whiting maintains, in his lectures, that

the uterine inflammation of puerperal women is essentially different from common inflammation, and that it is of an erysipelatous nature. To establish this doctrine, it is requisite that some decided difference should be perceptible in the products of the inflammation subsequent to delivery, in the changes of structure, in the progress of the symptoms, and the effects of the remedies employed. Of the numerous dissections which we have made of the bodies of those who have died from puerperal fever, we have not discovered in the morbid appearances any thing to justify this distinction. Instead of running a definite course in spite of the application of remedies, as erysipelas does when it appears on the external surface of the body, the inflammation of the peritoneum in puerperal women is in most cases completely cut short at the commencement, if the appropriate treatment be vigorously adopted. Erysipelas in other parts of the body cannot be cut short in this manner.

The following coincidence may seem, however, to prove that there is some connexion between erysipelas and puerperal fever. In the autumn of 1829, a short time before the epidemic broke out in the British Lying-in-Hospital, which led to its being closed for several months, two children died of erysipelas. Another fatal case occurred in the course of the epidemic, and on examining the abdomen we found the peritoneum extensively inflamed, with a copious effusion of sero-purulent fluid. A few days before the re-appearance of the disease in the hospital, in December, 1830, an infant died of erysipelas of the internal organs of generation and abdomen, and the same diseased state of the abdomen was observed. Another infant was attacked with gangrenous erysipelas of the extremity of the right fore-finger on the 28th of December, whose mother had been cut off on the 24th by uterine phlebitis.

Mr. Blagden has related to us a similar case which occurred in his practice. A midwife of the hospital had a severe attack of erysipelas of the face a few days after attending in labour a fatal case of inflammation of the absorbents and uterine appendages.

During the prevalence of the disease in the winter of 1831 and 1832, two children died from inflammation and suppuration of the umbilical vein, and in both there were patches of erysipelatous inflammation on different parts of the body. In none of the hospital attendants has erysipelas shown itself at any of the above periods, and cases of infantile erysipelas have repeatedly occurred at periods when there were no examples of puerperal fever.

Treatment.—Like inflammation of other organs of the body, that of the uterus varies greatly in severity in different cases. At some particular periods we have remarked the existence of a disposition to the disease in certain puerperal women, evinced by tenderness of the uterus on pressure, and by acceleration of the pulse, where inflammation has not been actually

developed, or where it has taken place in so slight a degree as to yield readily to the exhibition of opiates, and the application of hot fomentations and cataplasms to the hypogastrium. Some physicians, and more particularly the late Professor Chaussier, have been so convinced of the advantages and necessity of employing these remedies, with the view of preventing attacks of the disease, that they have caused all their patients recently delivered to take from time to time, and at intervals more or less distant, small doses of Dover's powder, and have applied emollient cataplasms to the region of the uterus.

In cases of intestinal irritation, after-pains, and various spasmodic affections of the uterus and abdominal viscera, this plan of treatment will prove successful. In slight inflammatory affections of other organs it is not unusual for the symptoms to subside without the employment of active remedies; and from what we have observed in many cases, it does not admit of a doubt that, in the milder varieties of inflammation of the uterus, a spontaneous solution of the disease not unfrequently takes place.

But where inflammation of the peritoneal coat of the uterus is fully developed, and where the affection occurs in a severe sporadic or epidemic form, the soothing plan of treatment will prove wholly insufficient to arrest its course, and unless bloodletting general and local, and other antiphlogistic remedies be early and vigorously employed, it will in most cases proceed to a fatal termination. In the treatment of puerperal fever, the great objects we are constantly to have in view are the following: first, to subdue the local inflammation of the uterine organs; and, secondly, to moderate the constitutional disturbance which it invariably produces. In fulfilling these indications no exclusive plan of treatment should be adopted, but we ought, according to the peculiarities of each case and stage of the disease, to employ bloodletting, mercury, opium, cathartics, diaphoretics, blisters, and whatever other means we can discover to possess an influence in controlling the disease.

In no inflammatory affection of the internal organs are the good effects of bloodletting, general and local, more strikingly displayed than in the first variety of uterine inflammation—peritonitis; but the results of our experience do not confirm the accuracy of the conclusions of some authors, that in all cases by the early employment of these means we can succeed in curing the disease. It is always an affection attended with great danger, and it not unfrequently runs its course rapidly to a fatal termination, in spite of the most prompt application of remedies.

When the symptoms of puerperal peritonitis manifest themselves as before described and in a violent form, twenty or twenty-four ounces of blood should be immediately abstracted from the arm by a large orifice, and while the patient has the shoulders and trunk considerably elevated in bed. We should not be deterred from

employing the lancet because the pulse is small and contracted, provided it does not exceed 110 or 115 pulsations in the minute; for in many cases the pulse has become fuller and stronger during the time the blood has been flowing or soon after, and there has been a marked relief from suffering. In all cases, if possible, a decided impression should be made upon the system, and where syncope or faintness follows the venesection, it increases the salutary effect. In no case of inflammation of the peritoneal surface of the uterus have we observed any bad consequence to result from depletion carried to this extent, and in many, from its early use, the force of the disease has at once been completely broken.

When the attack of inflammation is violent, and when the pain is but slightly relieved, the venesection should be followed without loss of time by the application of one, two, or three dozen of leeches to the hypogastrium, proportioning their number to the urgency of the symptoms. When the leeches have fallen off, the bleeding from their bites should be encouraged by warm fomentations or by a thin warm linseed-meal poultice applied to the hypogastrium. We have never observed poultices occasion uneasiness or an aggravation of the symptoms by their weight. Care should be taken to have them frequently renewed.

At the same time ten grains of calomel should be administered in combination with five grains of antimonial powder and gr. iſs or gr. ii. of opium, or with ten grains of Dover's powder; and this medicine should be repeated every three or four hours, until the symptoms begin to subside. Upwards of fifty grains of calomel have been given in many cases in this manner with decided benefit, and in two only out of one hundred and fifty-six patients has the mouth been severely affected. We have never seen the mercury in such large doses produce those symptoms of alarming weakness, and that tympanitic state of the abdomen with vomiting and great irritability of stomach, which some have represented. After the second dose of the calomel we have often exhibited with advantage a strong purgative enema, or a cathartic draught of senna and salts, repeating it also according to its effect. After the operation of the medicine in some cases, the pain of the uterus, which had been only relieved, has completely subsided.

There are few cases in which it is necessary to have recourse to a second bleeding from the arm; and where the propriety of this is indicated by a renewal of the acute pain, the quantity of blood taken away should not exceed $\text{℥}xii.$ or $\text{℥}xiv.$ However much the patient may complain of the uterine pain, if the pulse be above 120 and feeble, and if the powers of the constitution have been much reduced by the previous treatment, blood should not be drawn a second time from the arm. Should the pain continue undiminished in violence six or eight hours after the first bleeding, or still later, and the pulse be full and not very rapid, and the strength of the patient but little impaired, a second venesection, to the

extent above stated, may be ordered, not only with safety but with decided benefit. It ought, however, to be remembered that much greater caution is required in prescribing the second than the first bleeding in puerperal peritonitis; and where we are not fully convinced that it is absolutely necessary, it is better to repeat the leeching than to abstract blood again from the arm. In no case of peritonitis which has fallen under our care has it appeared necessary or safe to bleed from the arm a third time, and in a very large proportion of cases one bleeding only has been had recourse to.

After the violence of the attack has been subdued, it is proper to continue the use of the calomel, but in diminished doses. Five grains of calomel, combined with the same quantity of Dover's powder, should be given every six hours, and this should be continued until the mouth becomes affected, or until the uterine tenderness be relieved. The great object in the administration of mercury is to remove the congested and inflamed state of the vessels of the peritoneum, and to prevent the termination of the complaint by effusion of fluid, when all remedies are generally unavailing. In the epidemic which prevailed in the Maternité at Paris in 1829, mercury was not employed until the last stage of the disease; and it is to this neglect, and to the almost exclusive use of local bleeding and emetics in the first stage, when active antiphlogistic treatment only could have availed, that we are disposed to attribute in a considerable degree the frightful mortality which ensued.

Where the symptoms do not indicate an attack of a formidable nature, we ought not to carry depletion so far, or to employ mercury and opium in the doses we have now recommended. In many of the cases which we have treated, one general bleeding has proved sufficient to overcome the disease, and in many the application of leeches alone, with five grains of submuriate of mercury and an equal quantity of antimonial powder, or Dover's powder, with cathartics, have subdued the complaint.

Other means, besides those now described, have been recommended by different authors in the treatment of puerperal fever, such as *oleum terebinthinæ*, *ipæcacuan*, *digitalis*, *colchicum*, and camphor.

Since the oil of turpentine was introduced into practice by Dr. Brenan, the most contradictory statements have been published respecting its effects. In a paper published in the Dublin Hospital Reports, Dr. Douglas observes that in the epidemical and contagious puerperal fever, $\text{℥}iii.$ of the *ol. terebinth.*, with an equal quantity of syrup and $\text{℥}vi.$ of water, should be given three or four hours after the exhibition of the first dose of the calomel; and that after the lapse of another hour this should be followed by an ounce of castor oil, or some other briskly purgative medicine. In some instances the oil of turpentine and castor oil may be combined in one draught. The internal use of turpentine is not to be repeated more than twice in any case whatever. "In

several cases," Dr. Douglas adds, "where the debility is very considerable, the local bleeding may also be omitted; and in this case a flannel cloth, steeped in oil of turpentine, should be applied to the abdomen, and allowed to remain on for the space of fifteen minutes. This external application of turpentine, without either its internal use or the aid of bloodletting, I have frequently experienced to be entirely efficacious in curing puerperal attacks; and although I have hitherto omitted to speak of turpentine for the cure of the other varieties of this disease, yet I would not feel as if I were doing justice to the community if I did not distinctly state that I consider it, when judiciously administered, more generally suitable and more effectually remedial than any other medicine yet proposed. I can safely aver I have seen women recover apparently by its influence from an almost hopeless condition, certainly after every hope of recovery under ordinary treatment had been relinquished."

We have not ventured to prescribe in many instances the internal use of *ol. terebinth.*, either in the superficial or deep-seated inflammatory affections of the uterus; but whenever this has been done, it has not only produced a renewal of the pain, but has excited the most distressing nausea and sickness. The results of our own observations and those of the most accurate observers in this country coincide very nearly with those which are described as having taken place in the practice of Dr. Joseph Clarke: "In addition to the usual routine of practice," he observes in his letter to Dr. Armstrong, "numerous trials were made of the rectified oil of turpentine, in doses of from six to eight drachms, sometimes in plain water, sometimes combined with an equal quantity of castor oil. The first few doses were generally agreeable to the patient, and seemed to alleviate pain. By a few repetitions it became extremely nauseous, and several patients declared 'they would rather die than repeat the dose.' In more than twenty trials of this kind not a single patient recovered."

In favour of the use of *digitalis* and *colchicum* in puerperal fever, little evidence that is satisfactory has hitherto been adduced.

Emetics.—Willis, White, and other physicians employed emetics, and more particularly ipecacuan, in the treatment of puerperal fever, before the year 1782, when Doulcet recommended the exclusive use of these remedies at the Hôtel Dieu. Most exaggerated reports of the success of his method of treatment were speedily propagated throughout Europe, and many were disposed to consider the results at the Hôtel Dieu as affording unequivocal proofs of the power of emetics to arrest the progress of the disease when occurring in the most malignant forms. Two hundred women were represented as having been saved to society in the course of one epidemic in Paris, by the administration of ipecacuan at the onset of the attack. It appears, however, from the statement of Alphonse le Roi, that the recovery of so many individuals was attributed, without any just ground, to the peculiar

treatment adopted; for the employment of ipecacuan and *Kermes mineral*, according to him, was commenced by Doulcet in the lying-in wards of the Hôtel Dieu when the epidemic was ceasing, but these means were found wholly inefficacious in the months of November and December, and at the beginning of the following year, when the mortality was greater than in 1780, before the remedy of Doulcet was known. M. Tenon affirms that in 1786 the complicated puerperal fever was curable by no means then discovered.

From the intense pain of the abdomen, aggravated by the slightest pressure of the hand or by compression of the abdominal muscles, and from the early occurrence of nausea and vomiting in the worst cases of the disease, emetics obviously appear to be little calculated for the relief of the symptoms, and few enlightened practitioners have employed them in this country for the last forty years. Some have gone so far indeed as to declare that they are sufficient to produce inflammation where it does not already exist, and that their employment is not only useless, but dangerous and absurd.

Several distinguished continental physicians, as Hufeland, Oslander, and Desormeaux, have, however, continued to employ emetics in the treatment of puerperal fever, and have supposed that they derived benefit from their use. M. Tonellè states that M. Desormeaux first made trial of them about the end of 1828, and that great advantage resulted from it. During the greater part of the following year they were again employed, but they succeeded in only a few isolated cases, and most frequently they entirely failed; they never, however, appeared to produce any aggravation of the pain or other symptoms. A new trial was made of them after this, and they were again followed by the most happy results. At the commencement of September, 1829, in the course of a fatal epidemic, and during a cold and moist season, emetics were again had recourse to; and for the two months during which this treatment was pursued, all the sick were not relieved, but a great number were delivered from their sufferings by enchantment, and for an instant there seemed to be a renewal of that brilliant success which had followed the adoption of this method by Doulcet and the physicians of the Hôtel Dieu. But at the end of October emetics gradually lost their influence; and towards the middle of November no advantage whatever was derived from them. In some of the successful cases related by M. Tonellè it ought to be observed, that forty leeches, and warm cataplasms, had been applied to the hypogastrium before the emetic was given, and in those where the relief was most decided the ipecacuan either produced a profuse perspiration, or acted freely upon the bowels, causing numerous, copious, and bilious alvine evacuations. It is highly probable, from the histories of the successful cases, that the effects of the treatment were referable rather to the action of the ipecacuan on the skin and intestines than on the stomach, for the relief experienced did not immediately follow the

vomiting. M. Tonellè admits that where effusion or suppuration had taken place, emetics were of no avail; and he also relates a number of cases in which the application of leeches to the hypogastrium and the employment of other antiphlogistic remedies were followed by speedy and complete relief where emetics had entirely failed to procure this.

In the milder forms of uterine inflammation, (and many of the cases related by Tonellè were of this description,) it is highly probable that an emetic, which would produce a sudden determination to the skin and a free action of the intestinal canal, would relieve the congested and inflamed state of the uterus, and thus cut short the disease. We have met with no case, however, in which we have considered it safe to administer emetics in any stage of the complaint, and we cannot conceive it possible for a case to occur in which the treatment should chiefly or exclusively be conducted upon the plan of Doucet.

The application of blisters to the hypogastrium and inside of the thighs and legs, has often been found advantageous where the pain of the hypogastrium has continued severe after the general and local bleeding. The external use of the oleum terebinthinæ has also in some cases unquestionably been followed by considerable relief of the pain; and its effect is more sudden than that of a blister.

Both general and local warm baths have been highly recommended by foreign practitioners. Where the skin was hot, the pain moderate, the strength of the patient not much depressed, the immersion of the whole body in warm water was often followed by a general perspiration and relief of all the symptoms. On the other hand they state, that when the pains were excessive, when there was great anxiety, a profuse general or partial perspiration, the strength much reduced, the respiration hurried and anxious, and the face red with intense headach, the patient could not support the warm bath, and derived no benefit whatever from it. The hip-bath was found more generally useful, and was employed almost indiscriminately by M. Desormeaux in all the different varieties of the disease.

Recolin, Dance, and Tonellè highly recommend the injection of warm water into the vagina and cavity of the uterus, by means of an elastic gum canula. These injections were repeated three or four times in the course of the day, and they not only washed away the putrid matters adhering to the internal surface of the organ, but they appeared to relieve the irritation and inflammation of the organ itself.

In many cases of puerperal fever severe irritation of the stomach supervenes in the progress of the disease, and this symptom seems occasionally to be aggravated by anodynes and saline effervescent draughts. A drachm of sub-carbonate of potash should be added to $\mathfrak{z}\text{v}$. of aquæ menth. virid. and an ounce of this mixture given every two or three hours. The effect of this medicine in allaying the irritability of the stomach has been very remarkable indeed in some cases related to us. Should

diarrhœa take place spontaneously, or result from the use of the mercury, it must be moderated by opium. The starch and laudanum glyster is by far the best mode of administering the anodyne.

During the active stage of the complaint, cinchona, camphor, and stimulants are inapplicable; but when the inflammatory symptoms have been subdued, and the patient is left in a state of great exhaustion, quinine, ammonia, wine, and other stimulants sometimes produce the happiest effects in rousing the powers of the system. We cannot too strongly urge the necessity of continuing to employ these remedies, and whatever else is judged useful, whilst the slightest hope of recovery can be entertained. Some women have been restored to health where the pulse had risen to 160, and had become so feeble as scarcely to be felt at the wrist, where there has been constant delirium for many hours, and the most alarming prostration of strength. Recovery has even taken place in some cases where the abdomen has become tympanitic, and effusion to a considerable extent has taken place into the abdominal cavity. In no acute disease is it of greater consequence than in this now under consideration, that the patient should be visited by the medical attendant at short intervals, and that the effects of the remedies he prescribes should be narrowly watched.

With regard to the treatment of inflammation of the uterine appendages and of the deeper-seated tissues of the uterus itself, whether of the absorbents, veins, or of the muscular structure, the symptoms from the commencement are generally those which contraindicate the use of general bloodletting. In cases where the reaction at the invasion of the disease has been violent, and venesection has been employed, the relief obtained has only been temporary, if at all experienced, and in some instances the abstraction of only a few ounces of blood from the arm has produced alarming syncope. Where the local pain is severe, leeches and warm fomentations seem to be the appropriate remedies; but as far as our own observations go, we are in possession of no remedial means which effectually controul those varieties of inflammation of the deeper-seated structures of the uterus which we have attempted to describe. The French physicians are, however, of a contrary opinion, and are satisfied that we possess a powerful remedy, even in the worst cases, in mercury, employed so as to excite salivation. In several cases of uterine phlebitis we have pushed this remedy by inunction to a great extent, and brought the system under the influence of mercury in less than twenty-four hours; yet the progress of the symptoms was not arrested, and the patients died, as others had done where the remedy had not been administered. In other cases we have employed mercury to a great extent internally, without the slightest benefit; and it may justly be doubted, from the results of M. Desormeaux's practice, whether or not it possesses the influence M. Tonellè supposes, for of forty-three cases where mercury was used as the chief

remedy, only fourteen recovered. In the latter stages of inflammation of the deep-seated structures of the uterus, the great depression of the powers of the system renders the liberal administration of stimulants absolutely necessary, and in several cases of phlebitis the life of the patient appeared to be preserved by them.

The importance of the prophylactic treatment is rendered obvious by the preceding observations. A puerperal woman ought to be as careful of herself for ten days after delivery as an individual who is recovering from an attack of continued fever or inflammation of some important viscus. While the uterus can be felt above the brim of the pelvis, and the lochial discharge continues to flow, the most fatal consequences may result from exposure to fatigue or cold, and the slightest imprudence in diet. The administration of acrid cathartics soon after delivery should always be avoided, and no unnecessary pressure of the abdomen should be made. The greatest care should also be taken by the practitioner, in performing the operations of midwifery, to avoid inflicting an injury on the soft parts of the mother. The hand ought not to be passed into the cavity of the uterus but with the utmost gentleness, when the introduction of it is required to alter the position of the fœtus, or to withdraw the placenta; and portions of placenta should be prevented from remaining and undergoing decomposition in the uterus. It is impossible too strongly to condemn the practice recently recommended, in cases of flooding after the expulsion of the placenta, of passing the hand into the uterus for the purpose of compressing the orifices of the uterine sinuses where the placenta had adhered.

We cannot conclude this subject, which is unquestionably the most important in obstetrical medicine, without pointing out the necessity which there exists for a full investigation of the means best calculated to prevent the occurrence of uterine inflammation in lying-in hospitals, where its dreadful fatality has been recorded by all writers since the foundation of these institutions. From the registers of the British Lying-in Hospital, the Maternité of Paris, the Dublin Lying-in Hospital, and the tables of M. De Châteauneuf, it is proved that the average rate of mortality greatly exceeds that of establishments where individuals are attended at their habitations; and if it should ultimately appear that all precautions are unavailing in diminishing the numbers attacked by the disease, it will become a subject deserving of the most serious consideration on the ground of humanity, whether lying-in hospitals should not be considered rather injurious than beneficial to society. From what has fallen under our observation in the British Lying-in Hospital and other similar institutions in the metropolis, where the utmost attention is paid to ventilation and cleanliness, and where the wards are not overcrowded with patients, we cannot hesitate to express our decided conviction that by no means hitherto discovered can the frequent and fatal recurrence of the disease be prevented, and that the loss

of human life thereby occasioned completely defeats the objects of their benevolent founders and supporters.

(Robert Lee.)

YELLOW FEVER; Kendal's fever; Bilious remitting yellow fever; Bulam fever; Coup de barre; Mul de Siam; Fièvre Matorote; Fièvre Amaril; Vomito prieto; Vomito negro; Fiebre Amarilla; Nova pestis; Typhus icterodes; Typhus cum flavedine cutis, &c. &c.

The anomalies which this disease has been observed to present,—the absence, under the observation of one medical man, of some of the symptoms which during another epidemic had been well marked,—the fact of practitioners having observed that certain symptoms, prominent during one period of an epidemic, have at another period been totally absent;—the fact, too, of patients in the very same ward of an hospital being frequently found to labour under symptoms so variously grouped as to lead an inexperienced practitioner to believe that he had before him three or four diseases bearing little affinity to each other;—all these circumstances have thrown difficulties in the way of this disease having had a place assigned to it in nosological arrangements free from objections.

By some, accordingly, the yellow fever has been classed with continued fevers, the symptoms not having appeared to them to correspond with those laid down by nosologists as characterising remittents; while, according to the statements of others, of whose accuracy of observation there cannot be a doubt, the disease has assumed the most unequivocal remittent form: indeed, as will hereafter be shewn, there is very respectable evidence in proof of its having, on some rare occasions, assumed even the character of intermittents.

This is not the place to attempt defining what constitutes, rigorously, remittent fever: it is plain that in most countries the opinions of medical men are at variance upon the subject. The remarks of close observers go to prove how frequently remittents may be masked so as to mislead us, if not very much on our guard, as to their true character.

Those therefore cannot, with justice, be accused of much inaccuracy, who, confining themselves probably to their own field of observation, have looked upon yellow fever as belonging to the class of continued fevers; but it is important to shew whether those are right who maintain that the disease bears no affinity whatever to remittents, and that it *never* assumes any other than the continued form. On this point it cannot be necessary to quote more than a few authorities of respectability. Dr. Rush, from his extensive experience at Philadelphia towards the close of the last century, may be considered as entitled to the first place; and in his account of the epidemics of 1793 and 1794, he distinctly notices remissions in several pages:—"The remissions were more evident in this than in the common bilious fever. They generally occurred in the afternoon."* "It,"

* Account of Epid. of 1793, p. 79.

speaking of delirium, "alternated in some cases with the exacerbations and remissions of the fever."^{*} Speaking of the second class of this fever, he says that it was attended "with obvious remissions."[†] At p. 45 of his account of the epidemic of 1794, he says that the disease "appeared most frequently in the form of a remittent. The exacerbations occurred most commonly in the evening." In another passage, often quoted, "Never has the unity of our autumnal fever been more clearly demonstrated than in our present epidemic. Its principal grades, viz. the intermittent, the mild remittent, the inflammatory bilious fever, and the malignant yellow fever, have all run into each other in many instances. A tertian has ended in death with black vomiting, and a fever, with the face and eyes suffused with blood, has ended in a quotidian which has yielded to a few doses of bark."[‡] In an official report from Mr. Campbell, of the army medical department, dated from Montserrat, in 1825, he gives as his reasons for thinking that the remittents, &c. of the West Indies are grades of the same disease, that during a yellow-fever epidemic at Barbadoes in 1821, he observed "the most marked difference in the type and symptoms of cases of patients from the same barrack or hut, where not the slightest doubt could be entertained of the disease being produced in both instances by one and the same morbid cause, yet so modified by physical causes, connected with the patient, as to appear quite different diseases, and certainly requiring different modes of treatment." The frequent occurrence of yellow fever in certain parts of Spain entitles the statements of the medical men of that country to great consideration on the point in question. To begin with the late Dr. Arejula, who was so familiar with yellow fever as it appeared in most of the epidemics which have occurred in Spain within the last half century,—the writer of this article has been repeatedly informed by him that the disease frequently assumed the most marked remittent form. In his description of the Malaga epidemic of 1803,§ he tells us that the bark was found useful during the *remissions*. At p. 71 he is clear on the subject of remissions; and at p. 139, informs us that the disease "without doubt deserves the name of remittent fever."^{||} He even says, when describing a black-vomit epidemic, "the termination of our remittent in *intermittent*, which also occurred in some instances at the close of the epidemic, was an indication that the disease was about to be extinguished." The recorded opinions of Dr. Velasquez of Seville are fully in corroboration of the statements of Arejula. The following physicians were contemporaries of the latter gentleman, and had witnessed some of the yellow-fever epidemics of Spain: Dr. Balmis, who called

the disease, as it presented itself during the Cadiz epidemic of 1800, "a putrid malignant remittent;" Dr. Flores Moreno, who describes in his work "accessions and remissions;" Dr. Alfonso de Maria of Cadiz, who is a state pensioner in consideration of his services during some of the epidemics of Spain, says, "when the yellow fever degenerated into intermittent." In the third volume of Hurtado's *Decadas*, published at Madrid, may be found a memoir relative to one of the Seville epidemics, with the signatures attached of Drs. Gabriel Rodriguez, Serafin, Adame, Velasquez, and Chichon, to the effect that "sometimes, though rarely, the fever presented itself following the type of an intermittent."^{**} In the *Trozos ineditos* of Dr. Salva, professor of medicine at Barcelona, evidence is to be found of the disease having been observed to assume the remittent form. In conclusion of this part of the subject it may be stated that the records of the Gibraltar yellow-fever epidemics furnish the following names in support of the fact that remissions not unfrequently take place in this disease,—Drs. McMillin and Browne, Messrs. Sproule, Wild, Martindale, Amiel, Daw, Donnett, Humphries, Lee, and Hugh Fraser.

History of the disease.—Previous to entering into details, it may once for all be stated that a disease is here understood in which, along with other symptoms hereafter to be referred to, yellowness of the skin, partial or general, and, towards the fatal termination, vomiting of a black or dark-brown fluid, are frequent, though by no means constant, occurrences. As it will be necessary to refer frequently to the yellow-fever epidemics of Spain, and as, notwithstanding all that has been written upon the subject, the identity of yellow fever, as it has appeared in that country, with the black-vomit fever of the West Indies and North America, has been denied, so late as 1828, by a French physician (Dr. Rocheaux), who went to investigate the Barcelona epidemic of 1821, it may be proper here to premise that the *perfect identity* of the disease has been admitted to have been established beyond all doubt, at Gibraltar in 1828, as will be shewn further on.

Among writers on yellow fever, of different nations, the names of respectable men will be found who maintain the doctrine that this disease has only made its appearance in modern times on the continent of America, in the West India islands, and certain parts of Europe. In opposition to this it has been shewn by others, that though in former ages, as in modern times, this disease may not have been observed to prevail epidemically in that part of the neighbourhood of the Mediterranean in which Hippocrates practised, it is not the less true that this close observer had been familiar with a fever in which the two symptoms considered by most writers as characterising the disease, (yellowness of skin and black vomit) were sometimes present. Respecting black vomit, held as being so peculiarly diagnostic, Hippo-

* Op. cit. p. 62.

† Ibid, p. 82.

‡ Letter to Dr. Millar, New York Med. Repos. vol. vi. p. 249.

§ See his work on Yellow Fever, p. 25.

|| "Merece sin duda el nombre de calentura remittente."

** "Alguna vez, aunque rara, se presenta la calentura siguiendo el tipo de intermitente."

crates says, in the twelfth section of his prognostics, that if the matter vomited, in the form of fever which he is describing, be of a black colour, it betokens ill. In the first section of his prognostics, vomiting of a black fluid is mentioned as one of the most fatal symptoms; and in the fourth section of the same book this is pointed out by him as indicative of a high degree of malignancy.

We are reminded by Humboldt that the period of the first description of a disease furnishes no evidence of its having only then for the first time appeared; and the *ensemble* of the symptoms of yellow fever being perhaps only to be found fully and accurately detailed by writers of the last century, will scarcely be considered as furnishing conclusive evidence of the non-existence of similar epidemics at periods more remote. Owing to the state of medicine in former ages, and to the fact of practitioners having been so few that the sick were not unfrequently wholly destitute of aid, the exact nature of many epidemics which reigned from time to time, under the names of pest, pestilential disease, black death, yellow death, &c. has not been handed down to us. We have a remarkable proof of this in epidemics which from time to time prevailed in this country formerly, under the name of sweating sickness; for the accounts of that disease are quite unsatisfactory as to its nature. To admit that all epidemics of former ages, within certain parallels of latitude, and termed pests or plagues, were of the character of true plague, while all the epidemic fevers of modern times, which have so frequently afflicted the inhabitants of the same latitudes, have not possessed the characters of plague, but those of yellow fever, would be admitting what is but little conformable to the usual course of nature. Père Dutertre, one of the oldest writers on the yellow fever of the West Indies, employs the term *peste*, when detailing symptoms not corresponding with those of plague, but such as peculiarly belong to yellow fever.

To give here even but a partial view of the arguments employed by various British writers in support of and against the statement of the yellow fever having been imported into the West India islands for the first time in 1793, would occupy more space than could with any propriety be devoted to the point. Its importation into the island of Granada in the year in question rested chiefly on the authority of the late Dr. Chisholm, who believed that he had traced, with sufficient accuracy, the origin of the fever to the ship Hankey, which had lately arrived from the island of Bulam, situated on the west coast of Africa. This statement of the importation into the West Indies of a "*nova pestis*," as it was then called, has since given rise to much controversy; but those who consult Bancroft's Essay on Yellow Fever, and a small treatise on the disease published in 1818 by Dr. James Veitch, an experienced naval surgeon, will find details of a very interesting nature, which go to prove that on the occasion in question Dr. Chisholm had certainly proceeded on erroneous data. Indeed there can-

not be a doubt that, had he been better acquainted with the history of the diseases of the part of the world in which he then served, Dr. Chisholm could never have adopted the very erroneous opinion that the disease which he describes as so malignant, was one possessing new characters; for it is established by authentic historical proofs, that, long before the year 1793, a similar disease had made frequent ravages in the West Indies, as appears from accounts by Ligon, of an epidemic at Barbadoes in 1647;—by Hughes, of an epidemic in the same island in 1695; and again of epidemics there in 1720 and 1740, by Towne and Warren. Père Dutertre would seem to be the first by whom details of the symptoms and progress of this disease in the West India islands have been transmitted to us.* From the remarkable muscular pains often observed to take place in a patient labouring under an attack, as if from heavy blows, it was then called *coup de barre*; and Père Dutertre, considering it a new disease when he first saw it (1635), termed it "the pest unknown previously in these islands." He notices the yellowness of the skin particularly; and though he says in one part of his work that the disease was imported into the islands by "some ships," and in another page by a particular ship, La Bœuf, from Rochelle,—he says that those "were chiefly attacked who were employed in clearing the land in different islands, and were exposed to the poisonous vapours and exhalations."†

Père Labat, on landing at Martinique in 1649, found the disease raging in that island, and the monks belonging to the convent of his order suffered severely. He tells us in his work that he himself had the disease twice; that people were frequently attacked so suddenly and severely that they fell down in the streets; that hemorrhages from the several natural orifices, and even from the skin occurred; and that the disease usually proved fatal within five or six days. He states that the disease was called *maladie de Siam*, from the belief of its having been imported into Martinique by a ship of war, the *Oriflamme*, "which, coming from Siam with the *debris* of the establishments which had been at Mergay and Bancock, touched at Brazil, where she became infected with the disease which reigned there for seven or eight years."‡ This account of the introduction of the disease into Martinique relates to the year 1688, being some years before his arrival in that island; and his statement would seem to rest altogether on the belief then prevalent as to the circumstances.

At page 337 of Dr. Bancroft's Essay on Yellow Fever, we have evidence of the existence of the disease at St. Domingo in the year 1731; and, in subsequent pages, of its having prevailed there epidemically in 1733, 1734, 1739, 1740, 1741, and 1743. The insalubrity of that island was manifested soon

* Histoire Générale des Antilles.

† Ibid, p. 81, ed. in 4to.

‡ Nouveau Voyage aux îles de l'Amerique, tome 1.

after its discovery; for it appears that the sickness among his men gave Columbus great anxiety. It could scarcely have been expected that any thing very precise as to the nature of the disease from which they suffered should have been transmitted to us. The latest historian, Washington Irving, merely informs us that "when they fell ill their case soon became hopeless." Reasonable inferences may perhaps be drawn from passages in old Spanish historians. Oviedo, in his "*Historia General de las Indias*,"* speaks of a great mortality among Columbus's people in 1494, which he attributes to the humidity of the island. He says that those who returned to Spain were of a yellow or "saffron colour;" that people finding the country so unhealthy objected to go there;† and that in consequence three hundred convicts were at one time sent to St. Domingo. He adds, that if the king offered him the Indies he would not go there. M. Moreau de Jonnés‡ cites § one or two other passages from Oviedo on the same subject, which we have not been able to verify by a reference to the edition within our reach. Further details are given by Herrera (Madrid 1601) as to the violence, suddenness of attack, &c. of the disease which carried off so many of Columbus's men, at the time in question, in St. Domingo; and he refers to a letter|| written in 1498 by Columbus to the king of Spain, attributing the sickness of his men on their first arrival to peculiarities in the air and water.

Respecting the accounts of the existence of the yellow fever at remote periods on the American continent, it would appear that Dr. Fournier Pascey, of Paris, who for several years devoted much attention to all questions connected with the disease, considers it identical with a disease referred to by Ferreyra da Rosa, in his account of Pernambuco, printed at Lisbon in 1649. In the beginning of the last century the disease, from its appearance in various parts of Spanish America, under the name of *vomito prieto*, attracted much attention; and it is particularly referred to by the historian Ulloa, who resided for some years in that country. The word *prieto*, it may be remarked, is the Portuguese or nearly obsolete Spanish term for *black*: in Spain the word *negro* is now universally substituted. The first work *ex professo* on the black-vomit fever, as it appeared in South America, is probably a little pamphlet of sixty-two pages by a Dr. Gastelbondo, written at Carthagena (S. A.) in 1753, and printed at Madrid in 1755: he gives his experience of the disease during forty years; says, in the title-page, that he is about to write on a disease of frequent occurrence in that part of the world; mentions change of

climate and mode of living among the causes of the disease in new comers; and says that the natives of Carthagena, Vera-Cruz, &c. were not subject to attacks of the true black-vomit fever, though liable to the "*chapetonada*," a disease resembling it in some respects.

In North America the appearance of the yellow fever epidemically, at different times previous to 1793, seems unquestionable; and authorities may be cited for its appearance at Boston in 1693; at Philadelphia in 1695, 1741, 1751, and 1762; at Charlestown in 1695, 1732, 1739, 1745, and 1768; at New York in 1702; and in Virginia in 1744.

We come now to the history of yellow fever in that part of Europe where its frequent appearance epidemically, within the last half century, has so justly excited the attention of the profession and of those governments who rank the investigation of such subjects among their first duties. Some writers (among whom is Sir Gilbert Blane) have stated that the first appearance of yellow fever in Spain was at Cadiz in 1764; next in 1800 in the same city; and at Malaga, for the first time, in 1803. It seems strange that, with respect to Cadiz, those writers should have overlooked the remarkable epidemics at that place in the years 1730, 1731, and 1736, as recorded by different authorities; the two first being very particularly noticed by Villalba, in his curious work "*Epidemiologia Espanola*." It seems equally extraordinary that those writers should have overlooked the black-vomit epidemic which prevailed at Malaga in 1741, described by Dr. Rexano, and since frequently referred to by different authors. With respect to epidemics which are recorded as having frequently prevailed in Spain, previous to those of Cadiz and Malaga just referred to, many consider the evidence imperfect as to the disease having been, in any of them, similar in character to that under consideration; for in those days, as already remarked, all epidemics causing great mortality were called pests, or pestilential diseases. In epidemics called pests, recorded as having prevailed at Malaga in 1678 and 1679, two physicians, Drs. Checa and Molina, sent officially to inquire into the nature of the disease, pronounced it *not* plague. The writings of Spanish medical men being but little known to the profession at large, quotations from some of them on the present subject may be the more admissible. Dr. Hurtado of Madrid, one of the few modern physicians of Spain who have published their opinions freely on the subject of yellow fever, adduces proofs in support of the prevalence of the disease epidemically in former ages in that country. He quotes Dr. Garcia Suelto as being of his opinion that such epidemics appeared at periods much more remote than 1730, and cites him as stating that "the most distinguished men of the profession move as it were in a career new to them, but long known to Spaniards their countrymen. If the medical history of Spain had been more familiar to them, they would have availed themselves of the excellent descriptions and important illustrations to be

* Ed. in folio, 1547, book ii. cap. 13.

† Book iii. cap. 4.

‡ A man of science, formerly a military man, who, since his service at Martinique in 1802, as aide-de-camp, has figured a good deal in the discussions relative to the contagion of yellow fever as well as spasmodic cholera, though not of the medical profession.

§ Monographie de la Fièvre jaune.

|| Book iii. ch. 15.

found in the work of Antonio Fonseca, on the pest and contagious diseases, and on the epidemic fever of 1621." Hurtado also quotes Sebastian Nuñez, Pablo Correa, Manuel de la Cerda, and others. The frequent application of the word *atrabilis* formerly to any dark fluid ejected from the stomach, tended, no doubt, to create obscurity as to the character of diseases; and in Spain, medical men, for want of a better name, sometimes employed the words *fiebre dudosa* (fever of a doubtful nature) when speaking of the epidemic disease. Escobar is quoted by Villalba respecting an epidemic which prevailed in Carthagea in the autumn of 1648; and in which, contrary to what they observed to take place in plague, was attributed to local causes. Escobar states that in his time the endemic fevers of Carthagea and Alicant sometimes became *pestilential* in the autumnal months. It appears from Villalba's work, that in 1648 other towns besides Carthagea, as Cadiz, Seville, Alicant, and Valencia, were afflicted by the epidemic; and it is remarkable that some of the writers of that period state that the disease *was carried to the West Indies* from one of those towns, from whence it was again brought back to Spain, and commenced fresh ravages at Barcelona, Girona, Tortosa, and "almost in every town in Catalonia." From this we may at least infer that, at the period mentioned, the identity of the Spanish and West India diseases was acknowledged. According to Villalba, three formidable epidemics took place in remote times at Barcelona within a period of eighteen years—one in 1497, another in 1501, and the third in 1515; and as they prevailed in the summer or autumnal months, their identity with the modern epidemics of Spain has been inferred. Villalba records an epidemic at Barcelona in 1589, which lasted from June to December,—the deaths up to the 20th October having been ten thousand nine hundred and thirty-five. On this occasion the resident physicians of Barcelona maintained that the disease *was not plague*. A Dr. Porcel wrote, in 1565, on an epidemic which prevailed at Saragossa in the preceding year, and which ended in the month of December. He states that the symptoms were sometimes very insidious; that the patient seemed to be going on well,—pulse natural, skin temperate, &c.—till the fourth day, when the countenance became altered, and faintings took place, followed commonly by death: he adds that sleeplessness, extreme anxiety, (the patient rolling about the bed,) peculiar pain in the region of the stomach, and vomiting of a fluid (which he calls *colera*) of various shades of colour, took place. He notes, moreover, that the countenance became livid and yellow, (*livido y amarilla*.) The work of a Dr. Andosilla is also cited, in which he speaks of a disease under the name of *peste*, which prevailed in some Spanish towns in the autumn of 1600. He visited those towns by order of his government, and describes the disease as not having the characters of plague, but others new to him. In 1649, a Dr. Morillo, who had been em-

ployed at Marbella and other towns in Andalusia during an epidemic, went also to Gibraltar in that year, to witness an epidemic there, which, according to an old Spanish history of Gibraltar, proved so fatal that the people, losing all confidence in human means, instituted processions to the neighbouring hermitage of St. Roque, which were kept up annually in the month of August, till the surrender of the garrison to the British in 1704. There is a record of that garrison having, in the autumn of 1727, lost five hundred men by fever, but the character of the disease is not described. By a document in our possession from Mr. Hill, deputy inspector-general of hospitals, and bearing date June 13, 1832, it appears that in 1798 the forty-eighth regiment, which was under the medical charge of that gentleman, arrived in Gibraltar from England, and that soon after a severe fever appeared among the men, which carried off about one hundred of them. This fever, which he says was confined to the recruits, of which there were great numbers, "Dr. Harness, then physician to Lord St. Vincent's fleet, and afterwards one of the commissioners to the Sick and Hurt Board, declared to be precisely the same he had seen in the West Indies." In Trotter's *Medicina Nautica* it is stated that 257 deaths from fever took place in the above garrison in 1800, among the military; the average annual mortality among the military there having been only thirty-eight. With respect to Gibraltar, therefore, these facts may perhaps be considered as sufficient to establish that, previous to the remarkable yellow-fever epidemic of 1804, the disease had made its appearance there to a formidable extent: indeed it is well known that, along that part of the Spanish coast, no other form of fever proves so fatal. It may be added that Dr. Monro says in his work on the diseases of armies, that, in 1799, a fever made its appearance at Gibraltar, which he considered similar to that of the West Indies.

As the profession generally cannot be aware of the several places in Spain in which yellow fever has prevailed, we may be permitted to place on record the following list of cities, towns, and villages in which it is admitted to have appeared since 1800:—

In Andalusia.

Cadiz.	Paterna de la Ribera.
Sn. Fernando.	Sn. Lucar.
Puerto Sta. Maria.	Arcos.
La Carraca.	Xeres.
Rota.	Villa Martin.
Chiclana.	Espera.
Ayamonte.	Lebrija.
Medina-Sidonia.	Utrera.
Las Cabezas.	Mairena.
Los Barrios.	Cordova.
Algeciras.	Sevilla.
Gibraltar.	Antiguera.
Sn. Roque.	Carmona.
Alcala.	Ecija.
Ximena de la Frontera.	Moron.
	Montilla.

Espejo.
La Rambla.
Carlota.
Aguilar.
Grenada.
Malaga.
Velez-Malaga.
Ronda.
Vera.
Estepa.
Total number of places in Andalusia, 51.

In Murcia.
Murcia.
Jumilla.
Alborea.
Molina.
Cartagena.
Yelar.
Archena.
Alcaria.
Total number of places in Murcia, 16.

In Valencia.
Alicante.
Orihuela.
Sn. Juan.
Guadamar.
Peñacerrada.
Elche.
Alcantarilla.
Palmar.
Lebrilla.
Alhama.
Tabarca (a small island).
Total number of places in Valencia, 11.

In Catalonia.
Barcelona.
Barcelonetta.
Asco.
St. Eloy.
Total number of places in Catalonia, 7.

In Aragon.
Mequinenza.
Total number of places in Aragon, 2.

In Old Castile, 1 (St. Andero.)
In Guypuscoa, 1 (Passages.)
Total number of places, according to the best information, 89.

The above list is important, inasmuch as it must remove an impression that yellow fever has never appeared in more than a few places in Spain, and those sea-port towns. Among the places furthest from the coast where it has shewn itself, are,—Cordova, seventy miles in a direct line from the sea; Montilla and Ecija, about the same distance as Cordova; Ronda, sixty miles north of Gibraltar, and at an elevation above the sea of about four thousand feet; Granada, thirty-one miles in a direct line from the sea. In these places, as well as in a great majority of the other instances, the disease appeared to a limited extent only.

Respecting yellow-fever epidemics in other parts of Europe, that described by Palloni, Tomassini, and others, as having taken place at Leghorn in 1804, is the most remarkable. We have an account, by a Dr. Kennedy, of an epidemic at Lisbon in 1736; and from the symptoms there seems little reason to doubt of the identity of the disease with yellow fever. Professor Salva of Barcelona considers a fever

with yellow skin which prevailed very extensively in a district of the Canton of Berne, during a period of very extraordinary heat, in the year 1762, and of which there is some account in a volume of the proceedings of the French Academy of Sciences for 1763, as similar to the yellow fever of Spain. Some recognize this disease also in the fever with yellow skin, hemorrhages, &c. described by Frank as occurring in Hungary.

The existence of this fever with its characteristic group of symptoms, occasionally at points higher up the Mediterranean than those already mentioned, rests upon respectable authority: among others which might be quoted, Dr. Alexander, surgeon to His Majesty's forces, who has had ample experience of yellow fever in the West Indies, declares that he witnessed many deaths from the disease in Sicily, soon after the return of Sir John Stewart's army from Lower Calabria in 1806; and that while at this latter place, some cases occurred among our troops. The existence of sporadic cases of yellow fever with black vomit in England and France has been insisted upon by some persons: those referred to in the *Dictionnaire de Médecine*, vol. xxi. p. 17, as having occurred at Paris in the hot summer of 1822, seem most worthy of attention.

In turning to East India records, the mention, at p. 46 of the Bengal reports on cholera, of a fever with yellow skin, which occurred in that presidency in 1816, can hardly be held as conclusive. But we find, in a memoir by Mr. Walsh of the medical department of our army during the late Burmese war, that that gentleman, while in charge of cases of the fever prevalent in the army, was surprised by the sudden appearance of some with black vomit and yellow skin. It is recorded, as has been noticed by Dr. Johnson, in his work on tropical climates, that those symptoms appeared in a fever which prevailed in the hospitals at the Isle of Edam appropriated for the sick of the force employed for the reduction of Java in 1811.

At Sierra Leone this disease is recorded as having occurred, to a remarkable extent, in the year 1823.

Connected with the history of yellow fever, it is always considered a point of very great importance to ascertain whether it be a fact that, in those parts of the world where the disease is observed to prevail epidemically, sporadic cases have occurred in ordinary years. To the mass of evidence on this point, from the West Indies and America, not one word need be added in confirmation of this being the case in those places. In Europe a few only hold out against the statement:—in England, probably not more than two or three. But of late years so much attention has been paid to the subject, that unless people be prepared to prove that symptoms, grouped together in a certain order, in conjunction with similar *post-mortem* appearances, do not always constitute the same disease, it is quite idle longer to dispute the point. Among many other French physicians, who have paid great attention to the subject of yellow fever, and who have re-

cognised the existence of sporadic cases in Spain, are Drs. Pariset and Robert, leaders of the contagionists. In Spain we find the late Dr. Arejula, a leading contagionist in that country, and Dr. Flores Moreno, also a contagionist, admitting it freely in their works; besides Drs. Piguillem, Salva, and several other men of note. The writer of this article is in possession of such a body of evidence, drawn from registers and other authentic sources at Gibraltar, as would, of itself, place the matter beyond all doubt. In the month of April, 1829, the records of the civil hospital in that garrison were examined, and a certificate drawn up and signed by nine gentlemen, to the effect that thirty-eight cases, of which they found details duly recorded in non-epidemic years, were identical in character with the cases which occurred there during the epidemic of 1828. All those gentlemen had seen more or less of yellow fever, and some of them had witnessed two or three epidemics. There is, besides, further evidence in corroboration, by Dr. Gray, formerly physician to the Gibraltar naval hospital;* by Staff-Surgeon Glasse;† by the late Dr. Hennen, inspector of hospitals, in his official reports; by the testimony of medical officers of the Ordnance, the 12th, 23d, 43d, 64th, and 94th regiments, who saw several cases possessing the true character of yellow fever at Gibraltar, either before or since the epidemic of 1828.

The history of yellow fever cannot be dismissed without briefly touching upon its appearance from time to time on board of ships. It cannot be expected that where space is, as here, necessarily limited, all the cases of this kind of which records exist, should be noticed. In 1726 great havoc was made in the fleet of Admiral Hosier, lying off Portobello, by a disease alleged to have been yellow fever. In 1741, Admiral Vernon's fleet suffered from it off Carthage, (S. A.) In 1742, the disease broke out in the same fleet off Portobello. In 1776, the Spanish ships *Angel* and *Astrea* suffered from the disease on their way to the West Indies. It broke out in the squadron of the Spanish Admiral Solano, in 1783. In 1785, in the Spanish ship *Sn Il-defonso*. In 1793, in the *Sn Lorenzo*, one of the ships of the Spanish Admiral Aristobal, bound from Cadiz to the West Indies. In the same year in the squadron of the Spanish Admiral Borja. In 1794, on board His Majesty's ships *Bedford* and *Kent*. In 1795, on board the Hussar frigate on the American coast. In 1801, on board the ship *Penelope*, carrying Irish emigrants to New-York. In 1802, in a French fleet from Tarentum, bound to St. Domingo. In 1803, on board the *Hibbert* on her passage from Portsmouth to New-York. In 1805, in the fleet of the Spanish Admiral Gravina. In 1807, in the *Phebe* in the West Indies. In the same year in a French squadron in the bay of Cadiz. In 1808, on board the French brig of war, *Palinure*. In 1813, in an

English vessel which arrived at St. Domingo from England, as stated by Dr. Pinedo. In 1814, in a flotilla of Spanish revenue cruisers ("*guardacostas*."*) Since this period it appeared* in the following ships of war, on the West India station: *Iphigenia*, *Wasp*, *Tribune*, *Sapphires*, *Scout*, *Tamar*, *Bustard*, *Thracian*, *Rattlesnake*, *Lively*, *Isis*, *Scylla*, *Pyldes*, and *Ferret*. But the instances which of late years have attracted most attention, are those of the *Pyramus*, in 1822, in the West Indies;—of the *Bann*, in 1823, on the African station; of the Spanish merchant ship *Donostiarra*, in the same year, in the port of Passages in the Bay of Biscay; and of His Majesty's ship *Blossom*, in 1830, while engaged in surveying the Honduras coast.

Symptoms.—In no disease do symptoms appear to take a wider range than in yellow fever; and, on this account, it is usually considered necessary to speak of two or three, or even of four forms of the disease.

In the mildest form the febrile excitement may not proceed beyond that of mild synchus; indeed experience during epidemics warrants the conclusion that an individual, especially if a child, may pass through the disease with no more than a slight feeling of indisposition for a day or two. In epidemics of ordinary severity such mild attacks may occur in the proportion of one to ten or twelve of the severer grades; and their occurrence will usually be found more frequent as the end of the epidemic season approaches.

In a well-marked case, and in which premonitory symptoms (as *malaise* or slight head-ach) may or may not take place, the symptoms most commonly present are,—rigors, nausea, frontal, but especially supra-orbital head-ach, the conjunctivæ injected, and the eyes have a peculiarly brilliant appearance; aching of the calves of the legs and of the knees, more marked than in other fevers, and the rachialgia often quite intolerable. The loaded tongue, as if covered with paste, has been mentioned by authors; but, in our experience, a perfectly clean tongue has not unfrequently been observed in a most dangerous attack. There may be a remarkable trembling of this organ; or it will sometimes be swollen, and have its apex turned downwards. The most characteristic appearance, however, of the tongue, in yellow fever, is the pasty surface, with red edges and apex. In a young and vigorous subject, the heat of the skin may be of the pungent nature described by some writers on fever; but in yellow fever a temperate skin is far from being always an indication of a mild attack. An *impacted* state of the skin is always indicative of danger. Sensibility of the epigastrium frequently exists; but even in the severest cases free pressure can often be employed without an indication of pain being produced by it. Jactitation is a remarkable symptom: the patient tosses his head and limbs about incessantly, unable to procure sleep in any position, or relief from the feel-

* See Lond. Med. Repos., Nov. 1817, p. 417.

† See Sir W. Burnett, on Yellow Fever, 2d ed.

* See Wilson on Yellow Fever, p. 92.

ing of distress by which he is oppressed. In other instances, the patient, while lying pretty tranquilly, starts when approached, and seems terrified when spoken to. He draws deep inspirations; and sometimes, though languid, he will beg to be allowed to get out of bed, in the hope of experiencing relief. From the commencement there is a tendency to costiveness; never, as far as we are aware, to an opposite state of the bowels. As the disease proceeds in its course, the irritability of the stomach usually becomes one of the most remarkable as well as indomitable of the symptoms:—there is often, indeed, little use in directing medicine or drinks, even of the most delicate kinds and in the smallest quantities, as all are instantly rejected; and, altogether without resources, we often find ourselves obliged to look on in the expectation of the arrival of a tranquil moment, when we may again venture on the exhibition of something. Our experience during two epidemics (one in the West Indies, and that of 1828 at Gibraltar) by no means bears out the statement of others as to the *bilious* appearance of what is vomited in the progress of this fever: after having paid the closest attention possible to this point, we must, on the contrary, state, that with the exception of the black-vomit stage, and at the very commencement of the attack, what is thrown up consists of the ingesta and a glairy fluid. Bile is also *usually* absent on an inspection of the stools and urine. But it must be recollected that we are speaking of a disease which, like spasmodic cholera, furnishes exceptions to almost every rule which can be laid down regarding it; and with respect to bile in the urine, we find it occur in some cases, as distinctly admitted by a commission of Seville physicians, in their report of the yellow-fever epidemic in that city in the year 1819.* They mention that they found the urine “yellow, and paper dipped into it was tinged the same colour.”

The stage of excitement, with occasional rigors, may vary as to duration, from forty-eight to seventy hours; when the pulse, which up to this time may have been full, rapid, and more or less firm, begins to give way; the eyes lose their brilliancy; the patient in some instances becomes so faint as to be unable to sit, unsupported, on the night-chair. The attack sometimes terminates fatally at the end of the third day; in which case we have quickly added to the foregoing symptoms, a peculiar acrid or *burning* sensation in the stomach extending not unfrequently to the œsophagus; the temperature of the surface, but especially of the extremities, falls rapidly; no urine is secreted; the stools may or may not be very dark; the features shrink; a distressing degree of singultus takes place; and finally, the black vomit. More commonly, however, the disease, in epidemics of ordinary severity, does not proceed so quickly to a fatal termination, but will extend to the fifth, sixth, or seventh day: indeed fatal terminations at periods much later

are not uncommon; and a few extending to the twelfth and fifteenth day have passed under our own observation. Yellowness of the skin, varying from the lightest to the deepest tinge, may occur as early as the third or fourth day; but it oftener occurs at a more advanced period. This yellowness is usually first perceptible in the line of the large vessels of the neck, next over the chest, and then over the whole body,* the adnatæ becoming, at the same time, more or less yellow. From about the fourth day hemorrhage, most commonly from the gums and nose, is liable to occur; but it has been observed to take place from every orifice of the body, and even from the skin, and from under the nails. As this stage proceeds, the tongue becomes so black, shrunk, and incrustated, that it has the appearance of having been seared with a hot iron; the pulse becomes more feeble, irregular, and occasionally intermits; the stools are dark and gelatinous in appearance; the singultus becomes most distressing; and, finally, when the symptoms follow this order, coma not unfrequently precedes death. From observations made during the last Gibraltar epidemic, it would appear that in those cases where copious hemorrhage takes place from any of the natural orifices, black vomit and suppression of urine are much less likely to occur.

Where neither yellowness nor hemorrhage supervene, we may have a different group of symptoms set in, which lead to a fatal termination in a shorter time. The countenance of the patient may not indicate great danger; but he is observed to lie, his limbs being uncovered, with his head hanging over the edge of the bed: he seems sensible when spoken to, and will assist to arrange the bed-clothes, which soon again become displaced. The tongue is dry, furred, and brown or yellow at its base; its papillæ are often separated in a remarkable manner, and deep fissures sometimes take place in its substance. The pulse is feeble and intermitting; the stools are usually dark. The irritability of the stomach is more remarkable in those cases. In some, slight spasmodic twitches about the mouth may be observed immediately preceding death. In a few instances trismus has occurred. In the *early part* of the last Gibraltar epidemic, besides singultus, suppression of urine, and black vomit, a very remarkable symptom sometimes took place in these cases a few hours before death; viz. a loud, incessant, and monotonous wailing, extremely distressing to all within hearing; the patient, during the time, lying covered up, apparently insensible to every thing, and incapable of replying distinctly to questions.

Another form is where the deadly nature of the attack seems to be marked in strong characters in the countenance of the patient from almost its very commencement. The features seem shrunk, *decomposed*; the face has a mottled or ash-coloured appearance. The look is sullen,

* In Dr. Bancroft's Essay some interesting remarks will be found on the yellowness of the skin in this fever.

* Hurtado's Decadas, vol. iii. p. 121.

and the eyes are of a dull-red colour. The tongue possesses in this, more frequently than in any other form, the appearance pointed out as being most characteristic of the disease. There is usually little or no vascular excitement, and the surface is temperate, — sometimes below the natural standard from the commencement of the attack. The patient will perhaps say that he does not feel much the matter, and will move about as we converse with him; indeed he often possesses a surprising degree of muscular energy. Here hiccup generally sets in soon, with lividity and coldness of the extremities, only equalled by that which occurs in the worst forms of cholera. The patient does not complain of being cold. In this state the pulse can scarcely be felt at the wrist; sometimes not at all. The stools are sometimes of a light colour, small in quantity, and lying flat in the vessel. The ears and extremities assume a leaden colour; suppression of urine takes place, and the black vomit, with the acrid sensation in the stomach, may quickly set in, which close the scene, not unfrequently within forty-eight hours. But where the two symptoms last mentioned do not occur, life may be protracted to three days; the extremities being for a great part of the time so cold and clammy as to give a shock to those who touch them; and though they lie seemingly ungoverned, the patient is able to move them as he may be ordered. He will lie quiet for hours perhaps, but obtains no sleep; and on being approached, the eyes are found wide open. When asked a question, he seems to understand its meaning, and usually gives a pertinent answer; but he is generally taciturn unless spoken to. In those cases we seldom find that there is any yellowness during the attack.

By a few authors on yellow fever two symptoms have been mentioned as liable to occur, which have not presented themselves under our observation, — intolerance of light and petechiæ. The following symptoms, occurring in typhus, are not, as far as we are aware, liable to present themselves in the disease of which we are treating: — meteorism; the eruption termed *sudamina*; the contraction of an upper extremity; tinnitus aurium; the involuntary passing of the fæces and urine; deafness; sores about the mouth. Bed sores are not liable to occur, as in other fevers in those cases where relapses take place, or where the disease runs a course of many days. Furious delirium is not liable to occur; and though mild delirium and coma not unfrequently take place, the mental faculties in a great proportion of the cases, remain entire to within a short time of the fatal termination. Excoriations, causing great distress, have been observed to take place on the scrotum, penis, and about the anus. The statement as to the occurrence of gangrene on blistered surfaces has in no one instance been verified in the experience of the writer of this article. In some cases he has met with hemorrhage from leech-bites, very difficult to suppress. Anthrax is stated by a few writers to have been occasionally met with in yellow fever.

Infiltration of venous blood into muscular parts has been noticed as occasionally occurring in the disease in the West Indies; and the epidemic of 1828 at Gibraltar furnished a few cases in which a similar occurrence took place.

The observations under a former head preclude the necessity of entering here upon the remittent form of yellow fever.

Sequelæ. — With the exception of a very few instances, we find that, in the records of yellow-fever epidemics, chronic organic affections have not been much referred to. Dr. Alfonso de Maria has recorded that, after a Cadiz epidemic, several who had passed through the disease were recommended to go to St. Lucar in consequence of the visceral diseases which followed; and Mr. Munro, in his official report of the disease as it occurred in the seventy-seventh regiment, at Falmouth, Jamaica, in 1827, states that "in cases of recovery from this form of the disease, the patient was generally a considerable time afterwards affected with some organic complaint, either of the lungs, liver, spleen, or other viscera." It may be a question how far some observations of Dr. Rush, regarding the Philadelphia yellow fever of 1794, apply to this point; that "the moderate degrees of it were of so chronic a nature as to continue for several weeks when left to themselves."

Diagnosis. — From what has been said, it must be evident that great difficulties stand in the way of affixing pathognomonic symptoms to yellow fever; it has even been observed, especially in regard to children, that those very slight attacks which occur not unfrequently during epidemics, and in which we have not a single well-marked symptom of fever, seem to give the *admitted degree* of immunity, during subsequent epidemics. As in some other diseases, we must rather point out those symptoms usually considered characteristic of an attack, than refer to any as invariably present. Nausea and vomiting, especially after the first twenty-four hours, are far more constantly present and more distressing than in any other form of fever; the quantity ejected is sometimes considerable, though nothing had for some time previous been taken into the stomach: and in this last case what is thrown up, until perhaps about the fatal termination of the disease, is usually colourless, as if simply a secretion from the stomach. Though, as is well ascertained, a black or dark-brown fluid is now and then vomited in other diseases, there can be no question of this symptom forming, at the fatal termination of cases, a very leading character in the great majority of yellow-fever epidemics. It is necessary to speak thus as to the *majority* of epidemics, for here, as in almost every thing else which can be mentioned respecting the disease, remarkable exceptions occur; as, for instance, in the 84th regiment at Jamaica, in the epidemic there of 1827, when, according to the surgeon's official report, the black vomit rarely appeared in the fatal cases: and at Gibraltar, in the epidemic

of 1814, when the same was observed there among the military. In young robust persons, the suffused and red appearance of the eyes is held to be among the common signs of the disease; but a much more unequivocal one is, in others more advanced in life, an intense redness of the adnata, but without any brilliancy, the natural secretions of the part being suppressed, and giving to the countenance rather a ferocious expression. The red, or, as it has been called by some, crimson border of the tongue, ranks among the most characteristic signs in the first stage of the malady. Jactitation is of more frequent occurrence, and more severe in degree than in any other disease, spasmodic cholera not excepted. In the forms in which the excitement runs high, the aching across the loins, of the calves of the legs, and of the eye-balls, is more severe than in any other form of fever. Though, on particular occasions in the West Indies, yellowness of the skin has been spoken of as being "as often absent as present," the propriety of considering this as a symptom to be looked for in the majority of cases is evident enough from the name given to the disease by so many writers of different countries. This yellowness may be partial or general, and may vary from the light lemon colour to deep ochre-yellow.* Hemorrhages from the different orifices must also have a prominent place. Suppression of urine is, in desperate cases, infinitely more common than in any other form of acute disease, spasmodic cholera perhaps excepted; and it is probably only in this last disease that we have, as frequently as in yellow fever, the acrid or "burning" sensation in the region of the stomach so peculiarly distressing. It has been attempted to set up, as diagnostic of yellow fever, an excruciating headach confined to the orbits and forehead, without extending to the temples, but the general application of this as a guide has been justly questioned.

Prognosis.—The following are among the unfavourable symptoms:—the *early* appearance of yellowness, especially a shade of it similar to what occurs in patches in ecchymosed parts; intense rachialgia; incessant vomiting and jactitation; deep sighing; intermissions or remarkable depression of the pulse; aching of the eye-balls; singultus, and, according to some observers, the appearance of a few drops of blood from the nose at a very early period of the disease. Opposed to some of these may be reckoned among the alarming signs, a feigned gaiety, or an assurance on the part of the patient that he suffers little, at a moment when a practised eye can discover cause for apprehension.

A fatal issue may be looked forward to when the patient, although in possession of his faculties, lies for the most part on his back, in a state of collapse; his limbs pulseless, clammy, and stricken with a degree of coldness considerably below that which is found to take place in a corpse under a similar atmospheric temperature; while probably he complains of agonizing internal heat, and casts off the bed-clothes incessantly. When, on the contrary, the patient lies on his side, completely enveloped in the bed-clothes, the temperature not remarkably reduced, labouring under no very striking symptom, indifferent to passing events, and annoyed at being disturbed, but answering questions rationally; in this case it is often supposed that the patient is enjoying a tranquil sleep: where the acrid sensation spoken of takes place, and which sometimes extends along the course of the œsophagus to the fauces:—when we have, as sometimes happens, from the very commencement of the attack, a knitting of the brows, a sort of scowling, *sinister* look, with the remarkable redness of the eyes, and what may be called a mottled or *party-coloured* skin, in which livid, light olive, and ash-coloured patches of all sizes may be observed shading into each other:—where a loud, monotonous wailing takes place, or a violent, sonorous, heaving of the chest, amounting to the degree of dyspnoea liable to occur from extensive organic lesions:—when lividity of the ears and hands takes place, or livid blotches or swellings on various parts, from the infiltration of venous blood into the cellular tissue:—when we have trismus, or slight spasmodic twitches about the mouth, or long-continued singultus:—when we have profound coma,* or the small whitish stools referred to, or suppression of urine, or, finally, black vomit. With regard to the occasional recovery of patients labouring under any of the foregoing symptoms, the statement in reference to black vomit is perhaps the most worthy of attention; the general impression being that it is *invariably* a fatal symptom. Dr. Rush, in his account of the Philadelphia epidemic of 1793, states that "many recovered who had this coffee-coloured matter."† Mr. Amiel, (now surgeon to the 12th regiment,) who has witnessed three yellow-fever epidemics at Gibraltar, states that he met with two instances in children where recovery took place after the appearance of black vomit. Surgeon Callow, of the 84th regiment, says, in his official report to the Army Medical Board, relative to the yellow fever as it appeared in his corps at Fort Augusta, Jamaica, in the year 1827, that the black vomit "is not invariably fatal; examples more than one in

* Regarding yellowness, it is quite inconceivable how any writer laying claims to the smallest knowledge of this disease could have placed a very light or lemon yellow as the true *diagnostic* colour; for nothing is better known than that the skin may assume a very intense yellow; so that the perspiration is even sometimes found to stain the sheets, as is remarked by Flores Moreno, and was observed in a few instances at Gibraltar in 1828.

* It seems strange that Dr. Boisseau, the erudite author of the "*Pyrétologie Physiologique*," should, in his last edition (1831), have given the integrity of the mental faculties as invariable in yellow fever; for, although he is a good deal borne out by the statements of Deveze and some others, it is nevertheless certain that in protracted forms the opposite is sometimes the case.

† Page 54.

my regiment are now living." He states that Captain Pack recovered eventually, "though he had a vomiting of coffee-coloured fluid for twelve hours." Dr. Bone, deputy inspector-general of hospitals, who has had an experience of many years in the West Indies, is very precise upon this point in an official report relative to an epidemic at Barbadoes in 1821. He there not only refers to some cases in which recovery took place after having vomited black ("China-ink coloured") fluid, as well as "flaky brown blood, usually the precursors of the real black vomit," but enters into minute details relative to two cases, ultimately terminating favourably, where the fluid ejected possessed the most unequivocal characters.

Recovery may be hoped for, even where hemorrhage the most profuse takes place from one or more of the natural orifices, if the number of patients be not so overwhelming as to prevent the possibility of allotting to those who are in such a state incessant care and good nursing. Reasonable hopes may be entertained, when, in the ordinary forms of the disease, the pulse is not found to give way remarkably about the end of the third day. Distinct remissions have been remarked as favourable. Surgeon Callow says, "if a distinct remission occurs, it generally proves a favourable indication." If the skin, during the first forty-eight hours, maintain an equable temperature and softness, there is great probability that symptoms of a very severe character will not set in. Serenity of countenance and a facility in moving the eyes are favourable

indications; but, with respect to the first of these, it is especially to be remarked that traits, often so light as to escape inexperienced observers, are of high moment; and on this account additional advice should be resorted to whenever practicable, even in what may seem a very mild case. The miliary eruption noticed by certain Spanish writers is to be regarded as favourable; so, in a high degree, are some hours of sleep not broken in upon by vomiting; and so are, as perhaps need scarcely be mentioned, dejections of a proper colour. The restoration of the moisture and bulk of the tongue from the remarkably dry and *withered* state often occurring in the protracted forms, is one of the most promising signs. Whatever be the colour of the urine, its secretion in due quantity is always a favourable point, though not to be considered as one of the most prominent indications of a favourable issue.

On the whole, the yellow fever is considered the most *insidious* of all fevers; for it is known that in persons sitting up in bed amusing themselves, and apparently in a favourable state, the black vomit has suddenly appeared, quickly followed by death, to the utter astonishment of the medical attendants.

Morbid appearances.—1. In cases of *extreme malignity, and terminating rapidly (concentrated form,—congestive form)*. The party-coloured appearance remarked as existing during the attack in this form, more strongly marked, the lividity being more prominent, especially in the most dependent parts; and a pale yellow line, mingling with the other colours, can be observed from about the nose to the pubis. The ears, hands, and arms quickly become of a brown-black; the palms being equally dark with the backs of the hands. The penis and scrotum also become particularly dark. This appearance of the body has sometimes given rise to a hasty conclusion that rapid decomposition had taken place; but it does not appear, from observations made during a long time in dissecting rooms, that the odour of putrefaction takes place sooner after death from yellow fever than in other cases. *Cellular tissue*, unhealthy in appearance, but having no yellow tinge. *Muscles*, dusky, and softer than natural; so that they may usually be broken down by pressure between the fingers. *The heart*, same appearance as other muscles. *Liver*, change of colour seldom very remarkable; but light olive patches are sometimes observable, which would seem to indicate that a change similar to what is common in the more protracted forms of the disease had commenced in this viscus. No trace of inflammation, by adhesions, abscesses, &c. Congestion, though not always present in a remarkable degree, has been observed. *The gall-bladder*, remarkably diminished in size, (sometimes shrunk, and in other instances greatly attenuated); altogether empty, or only containing a *minute* quantity of bile of a deep orange-red colour, or of green bile, or of serum, or, more rarely, of pus; its mucous lining in some instances highly injected with blood of a bright red

* Dr. Bone, who seems to have paid much attention to the examination of the fluids ejected from the stomachs of persons labouring under yellow fever, describes them thus:—"1st. The contents of the stomach at the invasion of the disease. 2d. The fluid drank, mixed with green or yellow bile. 3d. The fluids drank, without any admixture or change. 4th. A fluid like indigo or China ink, brought up with some straining: I suppose it to be bile, for it coagulates with spirits of wine. 5th. A brown fluid, resembling urine in appearance. 6th. Brownish blood, not flaky, proceeding from the fauces and gums, and perhaps partly in some cases from the pulpy cardiac opening of the stomach. 7th. Brown flaky blood, mixed with mucous matter, proceeding from the gums, fauces, and stomach, usually the precursor of the real black vomit. 8th. *The real black vomit*, which also is blood altered by its passage through the vessels of the villous coat." At Gibraltar, in 1828, we were led to consider "*black vomit*" under the following forms:—1st. In thin flakes or portions of a brownish black colour, floating, like broken-up wings of a butterfly, in a glairy fluid, or in a fluid resembling an infusion of black tea. 2d. A perfect resemblance to a mixture of soot and water, or to the contents of a coffee-pot when the clear part of the coffee has been poured off. 3d. A homogeneous, intensely black substance, having a jelly-like consistence, and adhering in great abundance sometimes to the mucous coat: this, though never vomited up, and therefore more properly belonging to the *morbid appearances*, it is thought may not be altogether out of place here:—it is rarely found in the stomach, the intestines being much more commonly its seat. A simple test of true *black vomit* has been proposed, which is dipping into it white paper, which it does not tinge.

colour.* *The cystic duct*, in a few instances so completely closed that a probe could not be passed through it.† *Peritoneal surface*, free from adhesions or other evidence of inflammation. *Stomach*, free from what, in the present day, is admitted by the best authorities to be evidence of inflammation; mere redness, whether in streaks in various directions, or in stellated patches of various sizes, has been on several occasions remarked in the mucous membrane, in the same degree as it is observed to occur in chronic or other diseases, or in cases of accidental death, where there is not the remotest suspicion of gastritis. Spots of a purple colour are much more common than those of a bright red. A perfectly pale state of the membrane is far from being of rare occurrence. Dark streaks or patches in the mucous membrane are not uncommon, and would give an impression of their being occasioned by blood, changed in the capillaries to *black vomit* in its progress to the surface. This appearance no doubt it is which has given rise to the opinion that gangrene of the stomach occurs in yellow fever; but the most careful examinations at Gibraltar, in 1828, fully bear out those observers in America, the West Indies, and Spain, who deny not only that gangrene does take place in the disease under consideration, but also that any lesion whatever of the stomach is to be traced. As the same may be said, very confidently, with respect to the other parts of the body, it would be unprofitable to enter more into details upon this part of the subject; and it need only be observed further that here the contraction of the bladder has appeared to be constant.

2. *Where death takes place after the more ordinary forms of the disease.*—Little lividity of the skin, except in dependent parts. Where no yellowness has appeared during life, a little may now be observed about the eyes, at the sides of the nose and mouth, along the course of the large vessels of the neck, and about the chest. Where yellowness had existed during the attack, it now becomes more intense and general, and extends to the fat and cellular tissue; but it is proper to state that the assertion as to the pericardiac fluid and that contained within the ventricles of the brain being sometimes tinged yellow, has not been verified under the observation of many who have had ample experience in this disease. *Muscles*, their natural colour and firmness little altered. *Peritoneal surface*, free from adhesions or other evidence of inflammation. *Liver*, presenting remarkable changes of colour. Sometimes (as during the greater part of the Gibraltar epidemic of 1828) the colour has been a pale

olive, or mixture of green and yellow, usually taking place uniformly throughout the whole substance of the organ, in some rare instances alternating with dark green, in regular strata, and occasionally taking place in the left lobe only; the liver observed, at the same time, to be studded, or punctuated, very thickly, with minute spots of bright red, being, perhaps, the granulated structure retaining its colour. The colour of the liver is, in some cases, especially in women and children, lighter than here described. In children it has been observed, after having been merely put into water for a moment, to be as pale as box-wood. Another change of colour is to reddish brown, compared by some (Arejula, &c.) to that of red Peruvian bark, and by others to the leaves of an autumnal scene: this was almost the only change of colour which presented itself during the latter part of the epidemic season of 1828 at Gibraltar. Portions of the liver washed, pressed, or bruised in a mortar, did not give out colouring matter, whatever the shade might have been; and portions of the light olive coloured have remained unchanged by long immersion in spirits of wine. Little or no blood exuded from this viscus when deep incisions were made; and when broken up between the fingers, the impression given was what is termed *friability* of texture. No trace of bile has been observed in the pores on the occasion just referred to, nor had the hepatic or common duct been ever found obstructed, like the cystic; no traces of inflammation discoverable, and from the whole of what has appeared upon this subject, the morbid change may be considered as being connected with derangement of *function*. The *gall-bladder*, usually containing bile, of a highly inspissated and sometimes dark tar-like appearance. *Stomach*, not unfrequently found to contain the *black-vomit* strictly so called, and, though infinitely more rarely, may be smeared over with the dark adhesive and jelly-like substance spoken of under another head; containing sometimes an obvious proportion of blood mixed with other fluids; often the ingesta only, or mucus. Ruge, the "*état mamelonné*," together with appearances adverted to under another head, as they are admitted to present themselves very frequently in dissections after diseases of any kind, or, indeed, where (as in the case of accidental death) no disease had existed, need not be particularly entered upon on this occasion. Those who have asserted that ulceration of the stomach takes place in any form of yellow fever, are quite unsupported in the statement by observations made with the greatest attention and on a scale of sufficient extent: that mistakes have here, as on other occasions, often arisen from the facility with which the mucous membrane gives way on handling, there seems little reason to doubt. As to mere "*ramollissement*" of this membrane furnishing a proof of inflammation, this will not be now contended for, it is presumed; and it may be here stated that, on an examination in the case of a death by accident at Gibraltar in 1829,

* It is to be remembered that, though these appearances were so constant in the examinations made on an extensive scale at Gibraltar in 1828, they have also been occasionally found by pathologists in other fevers, and even in phthisis.

† This, as is well known, occurs in other diseases: if the peculiar valvular as well as spiral structure of the duct be not kept in view, we shall often be misled in supposing that actual occlusion exists.

where the man had been in perfect health previously, the whole of this membrane, in the intestines as well as stomach, was, in the hands of experienced persons from Paris, found to be so soft that, with the utmost care, not more than two or three lines of it could be raised at any point, but for the most part not even that quantity. The *œsophagus* presents an appearance, in some of the cases where *black-vomit* takes place, of this being thrown out from its surface as well as from that of the stomach, especially at its lower portion; an abrasion of its epithelion throughout its whole course has been sometimes observed, as in examinations after other diseases. The idea suggested itself at Gibraltar that this denuded state of the tube might give rise to the peculiar burning sensation noticed; but as the same sensation has been observed to occur frequently in cholera, a wider field is open on the point.

Duodenum, much of what has been observed regarding the stomach will apply here. *Small intestines*,—even in cases where no black vomit had been ejected before death, or where, on inspection after death, it had not been found either in the stomach or duodenum, the black jelly-like substance was sometimes found in the jejunum, but oftener in the ileum; and in some cases where it has been found both in the stomach and ileum, the whole intervening jejunum has not presented a trace of it. In a memoir by the writer of this article, from which imperfect extracts were some time ago printed in Paris, the remarkable fact was noticed that the ulcerations so liable to take place during the progress of typhus, as well as other fevers *malæ moris*, in that part of the ileum more especially occupied by the glands of Peyer, are not found to take place in yellow fever. The most trifling lesion has not been discovered in those parts of the intestine, on very careful examinations. The *colon*, its mucous surface sometimes covered with the adhesive black substance; in a few instances containing a quantity of a pale red fluid, approaching to blood in its character; is occasionally contracted at different parts. Whether we speak of the stomach or intestines, the mucous surface is usually found quite pale on removal of the particular substance described as being black and jelly-like. In the colon especially, but also in the small intestines, another substance has been occasionally found adhering in great quantity to the mucous surface; this has been compared by French writers to a mixture of linseed-meal and water; but it has been found of a lighter colour, so as to resemble the substance found sometimes adhering to the intestines of persons who have died of cholera spasmodica. Regarding red points or patches found not unfrequently in different parts of the intestinal canal, little need be added to what has been said, when speaking of the mucous membrane of the stomach, as to their not furnishing evidence of inflammation. If, as is the opinion of some of the most eminent pathologists of Europe, before inflammation

of this surface be admitted it must be shewn to be thickened as well as being red and so soft as not to admit of being torn off in portions of several lines in length, then may it, as we conceive, be with much certainty stated that the phenomena of yellow fever cannot, as has been supposed, be referred to *gastritis*, or *gastro-enteritis*. The *bladder*, in those cases where suppression of urine* took place, found contracted very remarkably, but without lesion. Mr. Linton, of the Naval Hospital, Jamaica, has noticed in one of his official reports, that he considered “the *pancreas* in some cases as being friable in texture;” but this has not been remarked by others who have paid the closest attention in their examinations; and regarding the alterations or lesions alleged from time to time to have been observed in other parts contained within the abdominal cavity, they do not seem to be verified in subsequent examinations conducted on a larger scale.

Within the cavity of the thorax no appreciable lesion of organs seems to be admitted in the more ordinary forms of yellow fever; the change of colour and friable texture of the heart, in the highly concentrated form, has been referred to. False polypi in the cavities of the heart have perhaps been more common in this form of yellow fever than is usually found to be the case after death from other diseases. In a limited number of cases, towards the close of the epidemic of 1828 at Gibraltar, the attention of the medical officers of the garrison was directed by some of the members of the French medical commission to those dark, well-defined, circular patches in the lungs, having very much the colour and consistence of the spleen, which have been noticed in other diseases, and the appearance of which was perhaps merely adventitious on the occasion in question. In the examinations made in the year just mentioned, the blood was not observed of the particularly dark colour attributed to it in this disease by a few writers. The question, however, as to the changes in the chemical properties of this fluid remains open. *Contents of the cranium*: In the course of the last Gibraltar epidemic, as well as on other occasions in the West Indies and elsewhere, extensive observations, carefully conducted, have quite negated any assertions made from time to time as to morbid changes in the substance of the brain; as an inordinate quantity of fluid in its cavities, or under its coverings; remarkable congestions; extravasation of blood; the effusion of lymph, &c.: even where profound coma had taken place in the Gibraltar cases, morbid states by which this might be explained were not discovered; and the deviations from perfectly natural states observed in any cases, were considered, by those who had most opportunities of making the examina-

* In some cases, especially children, retention of urine has taken place in this disease and been mistaken for suppression; so that, on a post-mortem examination, the bladder has been found distended above the pubis: the occurrence of this at Gibraltar in 1828 led to the practice of careful examination of the region of the bladder.

tions, as nothing more than the fortuitous appearances which present themselves in a proportion of instances, no matter from what disease death is produced, and which, as is now generally admitted, may arise from stasis, or the longer duration of the last agonies in particular instances: cadaveric changes, too, have, no doubt, given rise to mistakes, particularly as to great vascularity or congestion in the posterior and more dependent parts of the membranes of the brain, as it has regarding the most dependent folds of the intestines. *Contents of the vertebral column*, found to be equally free from lesion as those of the cranium. In examinations conducted on a small scale by a French medical commission sent to Barcelona during the epidemic of 1821, erroneous views had been hastily adopted as to the spine being the *fons et origo mali* in yellow fever; but those opinions were, wholly or in part, subsequently admitted to have been erroneous. Magendie having shewn that a certain quantity of fluid within the theca belongs to a natural state of the parts, errors on the part of future observers are less likely to occur.

Before quitting the subject of morbid appearances, it may be stated that a very remarkable occurrence presented itself in a few instances during the last Gibraltar epidemic,—the infiltration of venous blood, in the most uniform manner possible, into the cellular tissue of the minutest fibres of muscles. The whole substance of the muscles, which appeared almost black, seemed one soft mass, which yielded to pressure between the fingers as readily as the spleen. The blood thrown out became grumous, so that incisions caused but little exudation from the parts; no putrid odour or appearance of sloughing. In one man this infiltration took place into the whole of the muscles of the right thigh, the abductors excepted, from their origin to their insertion; in another the parts involved were the gastrocnemii of the left leg and flexors of the right arm. This man had suffered a good deal of pain in those parts, and the process was very rapid. In a third case precisely half the diaphragm (right side) was found in this state; and the infiltration, bound down by all the foldings of the peritoneum, extended in a most singular manner in one continuous sheet, from the diaphragm, posteriorly, down the right side to the bottom of the pelvis, keeping with great precision a line corresponding to the axis of the vertebral column, and covering every organ, or part of intestine, &c., which lay on that side. The muscles, except in the portion of the diaphragm referred to, were healthy. In this case the disease had run a rapid course, and some of the symptoms were well marked, as yellowness of the eyes and skin, violent jactitation, delirium, singultus, and dark stools, but no black vomit: a remarkable tremulous motion of the hands, not common during the epidemic, also took place in this case, near the close of the attack. We were not in those cases able to discover the rupture of any considerable vein.* Although Arejula notices in his work the occurrence of

large and painful tumours during some of the epidemics of Spain, which, had examinations after death taken place, would probably have been found of the nature just referred to, nothing as to the occurrence, in the yellow fever of parts of Europe, of the precise morbid states here referred to appeared till the publication, at Paris, in one of the numbers for 1829 of the Bulletin of Sciences, of an abridgement of notes, made by the writer of this, of the autopsies at Gibraltar, in 1828. Up to so late a period as 1828, the identity of the yellow fever of Spain with that of the West Indies had been denied by Dr. Rocheaux, who was at Barcelona in the epidemic season of 1821; but the editors of the Bulletin consider all doubt now at an end, "*identité parfaite*" being established by the account of those infiltrations in the cellular tissue in some of the Gibraltar cases. In America and the West Indies those appearances had been particularly noticed by Dr. Chervin of Paris, so celebrated for his researches in yellow fever for many years; they are particularly noticed in a communication to the Academy of Medicine, in 1827, by Dr. Keraudren, from one of the French West-India islands.

Mortality.—As has been frequently observed regarding other diseases, the malignity of the cases, and consequently the mortality, is usually much greater in the first than in subsequent periods of yellow-fever epidemics: the violence of the disease has, however, been known to receive, in some rare instances, a fresh impulse, as at New-York in 1822.* In *Hurtado's Decadas* it is stated that, of the first 134 cases treated at Murcia in 1804, not more than three or four recovered. Dr. Rocheaux, one of the French physicians at Barcelona during the epidemic of 1821, states, in his book on yellow fever, printed in 1823, that in the early part of the epidemic the mortality was in the proportion of 19 out of 20; that towards the middle it became much less, and at the close was only two-thirds.† In the early part of the Gibraltar epidemic of 1828, very few recoveries took place in the Civil Hospital; of the first thirty-five Jews received into the establishment, it is stated that all but one were swept away. On the same occasion, two corps in particular, as officially stated to the authorities by the late Dr. Hennen, then medical chief, were early attacked by the disease in a peculiarly malignant form, and suffered a loss of about one-half of the cases. On some occasions the form of the disease has been so mild that very few deaths have been recorded in proportion to the numbers attacked: even during the same epidemic, from a difference in the localities, or from other circumstances not admitting of easy explanation, there has been less mortality, in proportion, in one regiment,‡ class of persons,

* About the middle of October "the disease became again as fatal, or indeed more so, than at its commencement; the proportion of deaths being to the proportion of sick as three to four!"—*Townsend, Yellow Fever of 1822 at New-York*, p. 197.

† Vide p. 464.

‡ At Gibraltar, in the epidemic of 1813, the mor-

or family, without an essential difference in the mode of treatment, and solely arising from the disease having been milder. A full consideration of the subject must prove that the *expectante* system, or any system of "mild popular remedies," cannot be admitted (as has been attempted to be shewn) to be followed by less mortality than what our French neighbours call "*les moyens perturbateurs*." It does not appear that in their colonies, where trifling means only have been so often resorted to by the French, any good has followed. At Barcelona, in 1821, scarcely a patient survived in the wards given up to the distinguished members of the French commission.* At the period in question, the mortality, under Spanish and French medical men, in the establishment called *Seminario*, was 1265, out of 1739 cases treated. Under the *mild*, or what has been called the French and Spanish treatment, the mortality at Malaga in 1804 was 11,486, out of a population of 36,054. In the epidemic of the preceding year at the same place, 6,684 deaths occurred out of 16,517 attacked. In an epidemic at Xeres a few years ago, one-third of the whole population was swept off, under circumstances when, in the bulk of the patients, a few domestic remedies only could have been employed. Many other similar instances might be cited in proof of our being warranted in employing potent means likely to induce a favourable change in the form of the disease on its first invasion. From the wide range which the symptoms take,—so wide that, but for the *black vomit* being *liable* to occur, as a connecting link in the various forms during the prevalence of an epidemic, we should, from the symptoms, as well as *post-mortem* appearances, often have reason to suppose that different remote causes were giving rise to different impressions,—it is obvious that in no disease is it more difficult to lay down rules of practice, and in none can the medical man's tact and attention be more needed.

Nature of the disease.—It has been attempted, on various occasions, to explain the phenomena of the disease by the inflammation of certain organs or parts; and by the majority of those who have adopted this view of the matter, the gastro-intestinal mucous membrane is the part to which the morbid action has been assigned.† As might have been anticipated, we find this doctrine supported by all the ingenuity of Broussais and his followers; but by nobody has it been more strenuously advocated than by M. Boisseau, in his "*Pyrétologie*."‡ Among the medical men out of Europe who have advocated this last opinion, the statements of Dr. Bone, of the British army, who has been resident for many years in the West Indies, are

perhaps worthy of most attention: they are to be found among the many valuable manuscript documents in the archives of the Army Medical Department in London. What has been shewn, however, under the head of *morbid appearances*, will probably establish, to the satisfaction of our readers, that there are sufficient grounds for believing that the primary morbid action is not the alleged inflammation of parts. The inhalation of a specific poison has, as on other occasions, been considered by some as directly productive of changes in the chemical properties of the blood sufficient to account for the derangement of various functions which occur in this disease; but, without denying the probability of this, there is as yet nothing before the public to establish the point satisfactorily. Dr. Guyon, who practised for some years at Martinique, has spoken of this "*lésion*" of the blood as probable; and Dr. de Fernon of Paris, well known for his acumen in all matters relating to medical science, seems to favour this view of an alteration of the blood, '*primitivement*,' in yellow fever. In the most concentrated and rapidly fatal form of the disease, there is evidence, as has been shewn, in proof of congestion in the liver. By others, the nervous system is considered as primarily affected, and some observations lately made on this subject by Dr. Wilson of the navy, in his very ingenious book on yellow fever, seem particularly worthy of notice; especially with respect to the different train of symptoms to be looked for—on the one hand by the *abstraction*, and, on the other, by the *obstruction* of the nervous power in different individuals. The uniform integrity of the cerebral functions in the first stages of this malady, as observed at Gibraltar in 1828, and as noticed on other occasions by many authors—the extremely frequent integrity of those functions to almost the last moment of existence, in its '*congestive*' or most intense and fearful form,—together with the remarkable manner in which (in the last-mentioned form especially) the secretions are suspended,—induced the writer of this, when drawing up a review of the last Gibraltar epidemic (1828), to state his belief that the ganglionic system was involved, *very prominently*, in the series of morbid actions. That this should in any case be the first link of the chain can never perhaps be satisfactorily demonstrated; but on many occasions it appears highly probable from the manner in which several fatal signs concur with the suppression of the secretions, as if some powerful agent had been directly applied to that system of nerves which so specially presides over the secreting organs. But to enlarge on points necessarily speculative would be unfitting an occasion like the present.

Cause of the disease.—The more fully this subject is examined, the more evident it must appear that in the present state of our knowledge nothing satisfactory can be arrived at; for although, as will be shewn when speaking of *contagion*, reasonable causes have been sometimes assigned for the appearance of the disease on board ship as well as in certain localities, it

talities was so much less in the Military Hospital under Mr. Brown, that medical gentlemen were induced to inquire into his practice, which they found did not differ from their own.

* O'Halloran on the yellow fever of Spain.

† Tomassini, strangely enough, considers not only the gastro-intestinal mucous membrane as the seat of inflammation in yellow fever, but also the liver.

‡ Fourth edition.

has been impossible to assign appreciable causes in many other instances. What can be stated in this respect with regard to Gibraltar, will apply to other places. By ample tables in our possession, it does not appear that either before the appearance of the epidemic of 1828 in that garrison, or during its progress, any atmospheric changes took place differing materially from other years in which epidemics did not occur. The average heat was not greater* than that of the preceding year. The quantity of rain which had fallen up to the appearance of the epidemic was within a fraction of that which fell in 1827. The influence of a prevalent easterly wind had been much dwelt upon in the explanations offered respecting the epidemic at that place in 1804; but in 1828 no unusual prevalence of that wind took place. In fairness, we think that, like many other places which may be mentioned where yellow fever is known from time to time to appear, it cannot be admitted that Gibraltar furnishes sources from which *malaria*, in the usual sense of that word, arises, sufficient to account for the appearance of a malignant fever; neither can we concede to authorities of great respectability, that either there or in various other places the solution of the question is to be found in a crowded population, the filth of the town, or the state of the sewers; though the last may have been an auxiliary. Compared with Gibraltar, places might be mentioned where, as we know, yellow fever does not appear, in which those circumstances obtain in a much greater degree. It may be urged against the salubrity of Gibraltar, that the habitations are for the most part deprived of free ventilation, being backed by a rock of from twelve to fourteen hundred feet high; and that the impinging of the sun's rays, for so many hours daily, on the sloping and inhabited part of the rock, should be admitted to a share in the consideration: but the great mystery is, that with these and other circumstances in operation every year, the disease should only prevail epidemically in particular years. Though a certain degree of heat seems so essential, it by no means appears that epidemics have usually occurred in years most remarkable for heat. If we consider soil and elevation, it must be admitted that here too no satisfactory conclusion can be drawn; for if we find evidence, especially in the West Indies and on the American continent, of the influence of a marshy soil, on several occasions, this does not hold good in other instances; and in those countries, as well as in Spain, many places might be mentioned where elevation, soil, &c. would seem to guarantee immunity, but where, nevertheless, the disease occasionally prevails to a devastating extent.

Notwithstanding what has been here said, we do not apprehend that, in the present day, epidemic or catastatic influences in determining the irruption of diseases will be denied, though

not cognizable by our senses, or appreciable perhaps by chemical tests.

Influence of temperature, &c.—There is nothing connected with yellow fever which seems so invariable as the decline of the epidemic on the setting in of cool weather. At a temperature of about 50° Fahr., fresh cases soon cease to appear, and in Spain and North America the disappearance of the disease at a particular period is usually calculated upon with precision.

In some epidemics females have remained wonderfully exempt: this was the case during a terrific epidemic at Dominique and Martinique in 1801, as the writer of this witnessed; for while two battalions of the 68th regiment, composed of fine young men, suffered so much from the disease as not to be able latterly to furnish any men for duty, and had lost forty-six officers within six months, not a single woman was attacked; and it may be observed that, in those days, more females were allowed to embark with regiments from home than at present. Children were also exempt on the occasion in question. In some epidemics in Spain the disease has been observed to attack women in a milder form; while in others, as that of Xeres in 1811, they suffered in a particular manner. During the early part of the epidemic at Gibraltar in 1828, the women were attacked with great severity, but subsequently in a milder form. On that occasion, too, children under twelve months had well-marked symptoms.

Particular classes will sometimes suffer more than others; thus, according to a memoir by Mr. Hugh Fraser, lately surgeon to the Gibraltar Civil Hospital, of the first thirty-five Jews who presented themselves to him during the epidemic there of 1828, scarcely a single person recovered. Bakers and cooks have been said to suffer in a greater proportion than common; but perhaps the nature of their occupations permits fewer of these people, in proportion, from leaving a city or town when an epidemic prevails. Negroes are considered as being usually insusceptible of attacks; but even in them a susceptibility has been created, as on certain occasions in America, by a residence for some time in a different climate from that to which they had been long accustomed: indeed, without change of climate, they have, as instanced by Dr. O'Halloran in his report of the Jamaica epidemic of 1825-6, been attacked in considerable numbers, though not with equal severity as the white population. At Gibraltar in 1828, a negro, the servant of a hotel-keeper, had two attacks, one of which was particularly well marked. Circumstances connected with localities being equal, the upper classes of society seem, on all occasions, to suffer from attacks in a full proportion. Persons of regular habits do not seem less exempt from attacks during epidemics; but it may be admitted that their chance of recovery is greater than in the case of free livers. Those born or long resident in places where the disease is liable to prevail, will escape from attacks during the prevalence of some epidemics, while in others

* Average at noon, in the autumnal quarter, 76½
in the last quarter, 63½

(as in that at Barbadoes in 1816, and Jamaica in 1825-6) the old inhabitants will suffer in proportion. A well-marked attack on one occasion gives a great degree of security from attacks during subsequent epidemics: this was stated, some fifty years ago, by Lining, reiterated by Sauvages, and known so well among Spanish medical men, that the late Dr. Arejula placarded the fact on the corners of the streets in Medina Sidonia in 1801, with the view of insuring better attendance to the sick: the claims, therefore, of some persons of late years to any *discovery* on this point, are utterly groundless, as are the statements which would go to the denial of the fact, regarding the occasional occurrence of two distinct attacks at remote periods; and, were this a place for minute details upon every point connected with yellow fever, a list could be furnished of the names and dates of several which took place at Gibraltar. Relapses are very common: at Gibraltar, in 1828, one hundred and two cases of relapse occurred among the military alone; and their names have been registered in the medical office of that place. The occupiers of upper floors have, in many instances, especially at the commencement of epidemics, been attacked in fewer numbers than those on ground floors; and in the West Indies and Gibraltar, families occupying low huts have frequently furnished the first cases. The manner in which the disease has sometimes been confined to a particular extremity of a building, or even to a particular side of a ship, is well illustrated by surgeon Callow, 84th regiment, at Fort Augusta, Jamaica, in his official report for 1827; and by surgeon Wilson, Royal Navy, in his work on yellow fever.

Treatment.—It is painful to be obliged to admit that our advancement, within the last half century, towards any thing like a satisfactory treatment of this disease, in its formidable shape, has been sadly disproportionate to the degree of intellect brought to bear upon the subject within that time by professional men of different countries. Even with respect to those forms in which the symptoms, though formidable, are comparatively less intense, it seems very difficult to draw, from a review of what has been done by many, fixed rules for our guidance on certain points of practice. The discrepancy in the statements of respectable authorities regarding the efficacy of a particular line of practice can indeed be no otherwise explained than by the admission that in some epidemics very remarkable peculiarities occur.

Venesection may be particularly referred to in illustration; for though it has over and over again, after trials in the hands of men who are not to be set down as injudicious, been decried in our West India colonies as well as America; and though it has been generally abandoned long since by the experienced practitioners of Spain, we find it, nevertheless, lauded on certain occasions, especially very lately at Trinidad, jointly with the warm bath and other means, by persons of unquestionable judgment. On our first acquaintance with this disease, nothing would seem more plainly in-

dicated than this remedy, when the excitement runs high; but it has been too frequently found that after its employment, even but to a limited extent, the true character of the disease had been masked, and, as the Spanish practitioners express it, that the patient is speedily found to require all the strength which had been *taken away*. Frequently as we have witnessed blood taken from the arm in this disease, under a strong impression that a highly inflammatory action was going on, never has the blood, in a single instance, presented a buffy surface with a firm coagulum; it has on the contrary always formed a loose mass, yielding readily to the pressure of a finger, the serum separating very imperfectly or not at all. It may here be mentioned that our experience by no means bears out the assertion of some, as to the remarkably dark colour of the blood drawn from yellow fever patients. Without any intention to impugn the statements respecting the advantages derived from liberal venesection on particular occasions in the West Indies, it must be declared that the weight of evidence is against its general adoption in yellow fever, even where, *prima facie*, it would seem to be indicated. The valuable naval medical records at Somerset-house being rendered accessible for reference by the liberality of Sir W. Burnett, some highly interesting observations on the point in question will be found in the reports from Mr. Linton, who has been long resident in the West Indies, and for some time in charge of the Naval Hospital at Jamaica. Quite in accordance with our ample experience of the disease, as it has appeared in the West Indies and Gibraltar, this gentleman declares the disease as “decidedly not inflammatory,” though “inflammatory symptoms may concurrently or adventitiously take place;”—would adopt the expression “*inflammatio simulata*,” as expressive of “irritation or vascular sensibility:”—states that in the records, extending back for many years, the mortality was very great from the depleting system, which, from the *seeming* inflammatory nature of the disease, had been acted upon; and that “the *post-mortem* examinations which have occurred within the last twelve months [referring to a particular sickly season] presented no appearances which could be legitimately ascribed to this state [inflammation].” As in other fevers, circumstances will arise where the application of leeches to the temples, or of leeches and cupping-glasses to the epigastrium, may be strongly indicated; but the experience of others bears out the last-quoted gentleman in a remark that there is great risk of mischief from opening the temporal artery, collapse being very liable to be induced. Having mentioned cupping, it suggests itself (though perhaps not as a very promising speculation) that in the hope of affording some palliation of the incessant vomiting often so very distressing in yellow fever, we may give a trial to dry cupping on the epigastrium, as practised by ancient physicians in their endeavours to relieve the vomiting in malignant cholera. *Blisters*, with this object, are fre-

quently applied at an early stage to the same part; but to Mr. Linton of the Royal Navy the profession is indebted for a suggestion as to their application in another manner with the same view. He states in a report from Jamaica, dated September 1830, that having placed a blister the whole length of the spine in a certain number of cases, the irritability of the stomach was relieved in all except one. Their application to the head is sometimes found beneficial in protracted cases accompanied by cerebral affection. The *warm bath*, where we have not morbid heat of surface with high vascular action, holds its place as a useful auxiliary in the early stage; and where these symptoms predominate, the *tepid bath*, occasionally repeated, is employed by many; or, by some, the *cold bath*, or sponging with cold water, or with vinegar and water. Assiduous friction of the whole surface, after the bath in any form, has been considered beneficial. The promised advantages from Dr. Jackson's suggestion of a cold bath with frictions, immediately after a warm bath, have not been realized. The application of cold by means of wet cloths to the forehead has been found useful in relieving the severe frontal pains liable to occur in persons in the full vigour of life.

Regarding *internal remedies*, they cannot in truth be spoken of in this as in almost all other diseases, for in the generality of cases the irritability of the stomach is so great that hour after hour, at the period when medicines might be hoped to make some impression on the disease, drinks of the mildest kind and medicines of every description, even in the smallest quantity, are instantly rejected; and, driven to total despair of anything being retained, we are often obliged to leave nature to her own resources, in the expectation of an interval of repose. In a disease of this kind it seems quite impossible to explain how, up to the time of his death, large doses of the *bark* should have merited the special favour of Dr. Lafuente, one of the principal physicians connected with the epidemics of Andalusia during some of the first years of the present century. Where remissions take place, as noticed by several authors, as well during convalescence, the advantages from the exhibition of *quinine* seem to be generally admitted; but the doses must be regulated with caution, for given in large quantities, it has not only produced great irritability of the stomach, but much mischief in the head. Among a very limited number of practitioners have *emetics* been at any time in favour. Arejula, the great authority on the epidemics of Andalusia, informs us that in pregnant women he found their exhibition prevent abortion and its usual consequence, death: this, to the extent of a few cases, seemed to have been corroborated in the practice of a Spanish medical man at Gibraltar, in the epidemic there of 1828. In a report drawn up by a commission of Seville physicians, relative to an epidemic which prevailed in the quarter of Santa Cruz, in that city, in 1819, it is stated that much reliance had been placed on the exhibition of antimonial emetics

in the early stage.* In No. 16 of the *Gazette of Health*, there is a paper by Dr. Hacket, surgeon to the forces, in which, referring to a late period of sickness at Trinidad, he states that his "practice commenced in almost every case by an emetic of sulphate of zinc;" and it would seem that in the employment of this, in addition to his other means, he found sufficient reason for being satisfied as to its utility. This may be the place to refer to the exhibition of the nitrate of silver, given by Dr. O'Halloran, surgeon to the 77th regiment, at Jamaica, in 1827, in doses of from four to six grains, so as to act as an emetic; and from which this gentleman at one time conceived that he had received considerable advantages in his practice; but it is proper to state that, however further trials of this particular form of medicine may be warranted, he has not, in a conversation which we have had lately with him on the subject, expressed himself very confidently as to its efficacy. In regard to *purgative medicines*, there seems, among the mass of experienced practitioners, an admission as to the propriety of their employment in those forms where the excitement runs high, although the practice is not without opponents from the modern school, which refers the train of symptoms in this as in so many other diseases to inflammation of the gastro-intestinal mucous membrane. It is not an easy matter to conceive how, in this disease, bulky doses of drastic purgatives, as jalap, &c. could have merited the estimation in which they were at one time held, their immediate rejection from the stomach being always so exceedingly probable. This unquiet state of the stomach has led to a very general practice, especially (but by no means exclusively) among British medical men, of administering, in as small a form as possible, doses of calomel with the view of clearing out the bowels as a first step; and whether in the form of small pills, or the powder in half a teaspoonful or so of gruel cautiously swallowed, there is always a greater chance of its being retained than perhaps any other form of purgative. It would seem, however, that the proposed object may with more certainty be obtained by the application of the croton oil to the tongue, as particularly recommended in the number for August, 1825, of the *Medical and Physical Journal*, by Mr. Tegart, formerly chief of the medical department of our West India islands. A drop or two on the tongue has not only excited the immediate action of the bowels, without increasing the irritability of the stomach, but has also been observed to favour the secretion from the kidneys, a point perhaps of no small importance. In the paper by Mr. Hacket, which has been referred to, written this year (1832), no small share of success in the treatment of the yellow fever at Trinidad is attributed to the croton oil, which it would appear this gentleman gave in large doses, as well as exhibiting it in the form of enemata; for after mentioning the emetics of sulphate of zinc, bleeding in the warm bath, the shower bath, and enemata

* *Decadas de Hurtado*, vol. iii. p. 120.

of salts and castor oil, where there was much excitement, he states that "croton oil was invariably given to the extent of three or four drops. I have known this repeated thrice through the night; and it is most worthy of remark, the more irritable and distressed the stomach,—though, *primâ facie*, to those unacquainted with the great febrifuge virtues and extraordinary powers of croton oil in restoring the peristaltic motion of the intestines, which seems in other diseases to be inverted altogether, this irritability, hitherto our bane, (I may almost say the very leading feature and peculiarity of tropical fevers,) would be to them a cogent reason for not administering the oil—yet in almost all such cases it was found invariably to be triumphant, so that in the morning we generally found our patient thus treated with a perfect or nearly perfect remission." He says, a little further on, "the power of croton oil in allaying gastric irritability and general nervous excitement, as well as restoring the circulation to the surface, and thus relieving the congestive state of the internal and deep-seated central vessels, is really extraordinary; and though it may seem for the moment, when first given, to increase that irritability, yet after a little time I have hardly ever seen it fail in producing the desired end." Much as we are taught by experience not to be too confident in our expectations of the efficacy of medicines, from the advantages which may seem to result from their employment in particular instances, there is enough here, from a gentleman who has had ample field of observation, to draw special attention. According to an official report referring to the events of the epidemic of 1821 at Barbadoes, Dr. Bone, deputy inspector-general of hospitals, who had a very important charge at the time, relied chiefly on the exhibition of opening medicines of the saline class; during the first twenty-four hours, for instance, four ounces of Rochelle salts, with or without two grains of tartarised antimony, given in small doses. But if what he considers as obstruction of the gall-duct took place (shown by the absence of bile from the dejections), he continued this solution, with perhaps small doses of the extr. cathart. for three or four days, or until bile appeared. He varied his saline medicines to Seidlitz powders, Cheltenham salts, soda tartar., or potass. tartar.; or he gave the cassia fistula; and this, with the occasional use of the warm bath, seems to have been his widest range of practice. That on the occasion in question Dr. Bone should have displayed sound judgment cannot be doubted, from his extensive experience for many years in the West Indies, and from the remarkable degree of tact which he has displayed on many practical points connected with yellow fever. How far any of the alleged advantages derived from this practice may be attributable to the views lately promulgated by Dr. Stevens, it is impossible to say, as the question of the advantages of the exhibition of neutral salts in yellow fever, on the principle of their immediate action on the blood, is involved in controversy. But whether in re-

ference to the exhibition of small doses of neutral salts as here spoken of, or to the popular remedies long in use in Spain, of large doses of the supertart. potassæ, or of olive oil or of castor oil, the difficulty always presents itself as to those means being generally applicable in a disease where the excessive irritability of the stomach forms so prominent a character. *Enemata* are very generally had recourse to as useful auxiliaries: one consisting of sea-water only was preferred by the late Arejula of Spain. In the West Indies and other places a proportion of the ol. terebinth. has been sometimes used with the other materials. At Gibraltar, in 1828, the employment of enemata of every kind was not unfrequently found impracticable from distressing excoriations which took place about the anus.

Mercury.—On a review of the different modes of practice adopted in this proteiform disease, within the last forty-two years, by practitioners in the British West India islands, the United States, and Gibraltar, this remedy seems to have best maintained its ground; for though it be quite true that it has from time to time fallen into discredit from persons having, in the course of an epidemic, frequently found that, like all other human means, it made no impression on the most aggravated forms of the disease, it nevertheless has stronger testimony in its favour than any other practice which can be named. The late venerable Chisholm said, after a consideration of the subject during thirty years, "Are we then, from any vain or unfounded apprehension, from reasoning drawn from false premises, or from uninformed or prejudiced minds, to yield up the result of our own frequently reiterated experience?—to relinquish the best aid [*i. e.* mercury] which we can bring to the support and relief of our fellow creatures suffering under so direful a malady?—Forbid it humanity!—forbid it heaven!"

Since the history of the American epidemics of 1793 and 1794, by Rush, numberless have been the publications in which the practice, either by inunction or otherwise, has been recommended, and the medical archives of our army and navy contain very strong evidence of the great advantage to be expected from the remedy in one shape or other (though not to the exclusion of other means) in those cases where a hope from the employment of any remedies can be entertained. Among the latest authorities in its favour is Mr. Linton, of the Naval Hospital, Jamaica, the gentleman before quoted as having had long experience in the West Indies. He states in his official report of December, 1829, that in his practice, after purging, the bath, and blisters, he gave calomel every two hours, in doses of from five to ten grains, and that, where the symptoms made rapid strides, he commenced mercurial frictions at an early period. He states in a previous report that, where he had been tempted, after the first calm from various remedies, not to push the mercury, he "had frequent reason to regret this *misplaced confidence*." He says, "In every instance, as soon as the mouth became affected by the mercury,

so that pytalism was unequivocally established, the patient might confidently be pronounced convalescent." He remarks, with great judgment, and in doing so he is perfectly borne out by the experience of others, that "there is, however, a condition of the gums, which are only to a certain degree affected by mercury, which is often confounded with pytalism, and which has frequently induced some medical writers, unacquainted with or prejudiced against the use of mercury, to affirm that several patients die in a state of pytalism. A strong mercurial halitus may be perceived; the gums are swelled, spongy, and livid, and a clammy, thick secretion of mucus, *not saliva*, takes place; but under these critical circumstances farther progress of pytalism is arrested." Under these circumstances, and the symptoms not yielding, Mr. Linton recommends that the internal use of the remedy should be suspended; that generous nourishment, warm baths, and stimulants should be had recourse to, and frictions then continued in the hope of obtaining the desired end. In one of his reports he alludes to trials of the medicine in a particular form: "in three cases which recovered under similar circumstances, I have latterly employed a solution of oxy-muriate of mercury with decided good effect; but when the stomach is very irritable, this form of medicine is inadmissible." Another gentleman of long experience in the West Indies, (Dr. John Arthur,) states in an official report from Barbadoes, of the 17th of March, 1821, "I believe far the most recoveries have been after the use of this medicine in one shape or other." It is stated in a report of the same year by staff-surgeon Hughes of Berbice, that calomel was given with "*great advantage*, and one satisfactory conclusion to be deduced from its operation, when it affects the mouth, was that of the patients being on the side of safety." In a report from surgeon Callow of the 84th regiment, relative to the Jamaica epidemic of 1827, he states that he "relied considerably upon the specific action of mercury for ultimate cure;" that he employed the blue-pill "certainly with advantage," and inunction as an invariable adjuvant. It has been stated by Dr. Francis, when referring to the treatment adopted in the epidemic of 1822 at New York, that "mercury was considered by some physicians as conspicuous among the curative means." The history of the Gibraltar epidemics furnishes the names of many experienced men who have seen good reasons for relying much on the use of mercury in this disease; among these, Mr. Amiel, now surgeon to the 12th regiment, should, perhaps, stand first. This gentleman having witnessed epidemics in that garrison at three different periods, and closely observed the effects of treatment the most varied, considered mercury, up to the last case in 1828, as his "*sheet-anchor*."

It is scarcely possible to name a British author on yellow fever whose views do not accord more or less with those expressed in the extracts here given. Mr. Wilson, of the Royal

Navy, the author of a work of great merit in many respects, published in 1827, when referring to the treatment even of those aggravated forms "where the nervous torpor and vascular atony are great, and where re-action is tardy, irregular, and imperfect; where the patient, without complaint of pain, lies prostrate, letting the head fall from the pillow, or pushing the pillow away, the countenance being ghastly, pale, or livid in colour, and fatuous in expression, the iris scarcely influenced by light,"—informs us that "calomel ought to be administered in most cases from the beginning; it should not be delayed beyond the operation of the purgative medicine. The quantity of this most valuable remedy and its manner of combination with others, must of course be varied according to circumstances; but the dose must on the whole be large and often repeated. If the character of the disease be not changed at an early period, its end will generally be in death." He adds, "with the other remedies recommended, I have given, and would give, ten, fifteen, or twenty grains of calomel twice or thrice daily, with a grain or a grain and a half of opium to each dose, according to the state of the digestive organs." The other means to which he here alludes are warm-baths of high temperature, ("above that which a person in health could bear,") and continued for some time, and assiduous friction after their employment; warm purgatives, combined with aromatics; warm drinks; warm stimulating injections; occasionally a little brandy, oil of terebinth in small doses; blisters over the epigastrium, between the shoulders, and to the head. He says that he was not deterred from this practice, in the forms alluded to, by the nausea and vomiting so characteristic of this fever. Like what occurs sometimes in the stage of re-action in cholera, he found it useful to abstract blood cautiously in the period of re-action following the low state of the animal energies here referred to. The *rationale* of Mr. Wilson's practice is extremely ingenious and well worthy of attention. He admits, as all must, "that in many cases the resources of our art have little influence on the disease, and that in its worst forms it is utterly beyond control." Indeed, it is not permitted us to be too sanguine as to the efficacy of any remedy in even a seemingly mild case of this "*perfidious*" disease; and the specific action of mercury, even after baths and aperients, will often fail to take place, the torpor of the absorbents being quite insurmountable; but as in an infinity of cases we can have no right to *assume* that this is the case, it must rest with the judgment of practitioners to decide how far they may be warranted in withholding a remedy standing so recommended as this does from various quarters.*

* The remedy was adopted by Palloni, in the yellow-fever epidemic of 1804, at Leghorn. Among the Spanish practitioners who have adopted it are Dr. Flores Moreno, of Cadiz, Dr. Ardevol, of Gibraltar, and Dr. Bobadilla, also of the latter place, who had experience in epidemics of Andalusia during thirty years, and who was so confident

Of one thing we have ourselves been convinced by ample experience, that though patients may often do well under other treatment, the medical attendant will be *infinitely less likely* to be taken by surprise, when pyæmia once sets in, by the sudden invasion of those symptoms which, within a couple of hours perhaps, are known to cut off a patient who seems to be in a state of convalescence, or nearly so. An objection is often made that, in the employment of these means, "*we lose time*;" and a very excellent objection it must be considered to be when it can be shewn that in the average of epidemics (for it is quite a delusion to speak of what takes place on particular occasions) other plans are found more useful.

Previous to dismissing the subject of the exhibition of mercury in yellow fever, it may be well to quote an observation from a gentleman in the West Indies, which goes to meet another objection sometimes made: "calomel does not, that I can perceive, produce any better effect in doses of twenty grains than in those of five; but even in very large doses I have *never* known it to cause hypercatharsis or any other bad symptom."*

The foregoing extracts are selected from a great mass to the same effect, as they complete the evidence that, up to the latest epidemics, mercury has been considered as holding a prominent place among the remedial means from which most hopes are entertained in yellow fever.

In the cases of profuse hemorrhage which frequently occur, the stomach is usually more retentive, and a bitter infusion, with a proportion of sulphuric acid, is found beneficial. The bleeding from the mouth is so excessive sometimes as to excite great apprehensions, but a strong solution of arg. nitr., applied very freely over the gums or other parts from whence blood is chiefly observed to flow, will often check it. In this stage of the disease every thing may be expected if circumstances admit of incessant good nursing, with the frequent supply, in small quantities, of nourishing articles of diet, as sago, arrow-root, broths,

of the remedy (chiefly in the form of inunction) that, on the invasion of the epidemic of 1828, he memorialized the governor of Gibraltar to be suffered to treat some of the military exclusively on his plan. The exhibition of mercury of late years by some of the best practical men in Great Britain and Ireland, not only in fevers *mali moris*, but in diseases purely inflammatory, including arachnitis, will probably tend to dissipate the prejudices of the French against the remedy. They have, indeed, already, by the admission of Messrs. Louis and Trousseau at Gibraltar, gained advantages from the adoption of mercurial frictions at Paris in puerperal peritonitis, a case of which seldom recovered under former practice there. Perhaps, too, as, according to the same gentlemen, two of every three cases of typhus die at the Paris hospitals, advantages might be looked forward to there by the adoption of the more energetic system of those British practitioners who find the exhibition of mercury diminish the mortality in this last disease.

* Surgeon Macdermot, 4th regiment. Official report to the Army Medical Board, December 20, 1821.

panado, &c., and wine or porter. This may be the place to refer to the hemorrhage from leech-wounds, formerly stated as likely to occur, and which it is extremely difficult to suppress when in soft parts, as the epigastrium; here minute bits of lint, dipped in the tinct. ferri mur., and pressed on each bleeding point by means of a probe, will be found more effectual than even the application of caustic in substance.

The occasional employment of other remedies, as saline draughts, sudorifics, opiates, ether, various cordials and aromatics, call for no particular remark. Where the remarkable "burning sensation" takes place, extending sometimes as high as the pharynx, from about the cardiac orifice of the stomach, calcined magnesia and prepared chalk have each afforded occasional relief; but these cases must be considered as utterly hopeless. When in the advanced stages great exhaustion has been produced by the incessant vomiting and want of sleep, a moderate dose of opium and capsicum, in minutely-divided pills, has sometimes produced a better effect than other medicines.

The most grateful *drinks* are spruce or ginger-beer, or a mixture of the white of egg, sugar, water, and some aromatic. As no small consideration in the management of patients, the *temperature of the hospitals or apartments* demands great attention. From what they have seen useful in other fevers, those unacquainted with the peculiarities of this disease are very apt to err on the side of over-ventilation, whereby, in some of its forms and stages, the vital energies are liable to be lowered perhaps to an irretrievable degree in an inconceivably short space of time; hence *tents*, or slightly-constructed huts, or temporary buildings are always objectionable. During the epidemic of 1828 at Gibraltar, a visit was made to one of the hospitals by Dr. Broadfoot, Mr. Amiel, and the writer of this article, when it was observed that in two of the wards an extraordinary proportion of the patients were doing well, and that in almost all these the specific action of mercury on the salivary glands had taken place. On inquiry it was established that, from an accidental circumstance, these wards were what might be called, *very badly ventilated*; and the circumstances altogether struck Mr. Amiel so forcibly that he instantly returned to his own hospital (12th regiment) and altered the plan of ventilation which had been previously adopted. This may at least be sufficient to draw attention to the point.

Contagion.—Those who have in the least entered into the subject of yellow fever must be aware of the total impossibility of giving, here, even a slight sketch of all that has been brought forward from time to time on this part of our subject. The discussions regarding a great mass of details, up to a certain period, may be said to be condensed in the works of Blane, Fellowes, and Pym, on the side of contagion; and of Bancroft, Jackson, Maclean, and Burnett on the opposite side. The elaborate works of

Dr. Bancroft especially (" *Essay on Yellow Fever*," " *Sequel to an Essay on Yellow Fever*,") embraced whatever could at the time be deemed the most essential points for consideration. From his analysis of the events of 1793 in the West Indies, as well as from statements furnished by other writers and the details given in the first part of this essay, it must be evident that Dr. Chisholm could not have been acquainted with the history of the disease when he stated that it made its first appearance in those islands in the year just mentioned. Dr. Bancroft's arguments against the importation of the disease in that year by the ship *Hankey* are greatly strengthened by the facts brought forward in a pamphlet on yellow fever by Dr. Veitch, of the Royal Navy.

It is usual to refer to Père Labat's statement of the alleged importation of the disease into Martinique, in 1682, by the ship *Oriflamme*, from Siam; to which it is objected that he has merely given vague reports of circumstances which occurred several years before his arrival in that island; and that if, as he states, the disease had been contracted at Brazil, where the ship touched, it was palpably erroneous to say that it had been imported from Siam. In the second volume, page 119, of Dr. Chisholm's work on the fevers of the West Indies, he gives an account, also, of an importation of the yellow fever into the island of Martinique while in our possession in 1796, which is very circumstantially proved to be erroneous in a paper to be found in the eighth volume of the *Medico-Chirurgical Transactions*, by Dr. Fergusson, inspector-general of hospitals, who happened to have served at the time with the troops on board the ship alleged to have imported the disease. There can be no doubt that among those who supported the views of Dr. Chisholm on contagion, respectable names are to be found; but even so soon after the periods to which he refers as 1801, when it fell to our lot to witness devastating epidemics in Martinique and Dominick, our experienced medical chief, Dr. Theodore Gordon, did not think it expedient to suggest any measures applicable to contagious diseases, nor did an apprehension upon the subject of contagion ever escape the lips of any of our seniors with whom we served. As regarded the men and officers on this occasion, an individual coming in contact with the disease for the first time could hardly, perhaps, form an opinion worthy of much attention; but a most remarkable circumstance was the *total* exemption of women and children under a certain age, as already noticed in the historical part of this essay, although no steps were taken in the way of precautionary measures.

In examining the official documents to be found in the office of the Army Medical Board in London, the following passage, contained in the report of inspector-general Tegart, dated 10th of March, 1823, is particularly striking: "In the various annual reports of the medical officers in this command, I have not seen one favouring or supporting the theory

of contagion: they are all on the other side." This seems the more remarkable, as isolation of yellow fever cases, to a greater or less extent, was a measure approved of a short time before by Mr. Inspector Green, one of those gentlemen who had previously served in the West Indies about the time of Dr. Chisholm.

Mr. Tegart, referring in his report to certain cases which occurred at Antigua in 1801, says, "The result is that this was decidedly yellow fever, and that the disease ceased on removal from the place, and was confined solely to those persons who occupied the room. Here is cause and effect." It must be admitted that, among the advocates of the contagion of yellow fever, very few are to be found in the West Indies in the present day.

Dr. John Arthur, however, in an official report from Barbadoes, of the 17th of March, 1821, furnishes a mass of details, the result of his own observation, favouring that side of the question; and although most of his details on this point may be considered by some as only *simulative* of contagion (the great error of former observers) as they relate to individuals exposed equally or nearly so to other general causes prevalent at the period, the document is one which deserves on every account to be referred to, and especially should a parliamentary investigation on the subject of the contagion of yellow fever be again instituted in this country. Among the few who have of late years advocated the doctrine of contagion in the disease as it prevails in the West Indies, surgeon Callow of the 84th regiment is to be mentioned. In an official report, detailing the events connected with the epidemic of 1827, in his corps, at Fort Augusta, Jamaica, he states that, after a certain time, "strong evidence of the disease propagating itself began to appear." His chief reasons for coming to this conclusion seem to be that the attendants about the sick of every denomination suffered remarkably, and that the surgical patients were also attacked. In the report itself, however, unbiassed persons will discover the following reasons for hesitating before they draw similar conclusions:—1st, he states, that previous to the breaking out of the epidemic, he made an official report on the defects of the building occupied as an hospital, and situated close to the *lagune*, whence disagreeable odours arose: 2dly, that, during the epidemic, the winds in the night "had generally blown from N.W. very strong for some hours, a very unusual circumstance," the more prevalent winds from E., S., or S.W., preserving, as he states, the low sandy point on which Fort Augusta is built, from more frequent sources of sickness. 3dly. He describes the barracks as being in three ranges or divisions, and that, up to a certain day, every case which occurred had been at the *extremity of each range of barrack*, "and in no other;" a very remarkable fact certainly. 4thly. It appears that, after his regiment removed from Fort Augusta to a camp-ground near Stony-Hill, it became healthy, any fresh cases being,

as he admits, traced to their origin in the Fort : some of the men confessed, indeed, that they had been ill previous to the move. Dr. Weir, physician to the forces, in commenting on these events, in an official report dated Kingston, February 13, 1823, remarks that "there are some circumstances connected with the history of the lately prevailing epidemic, which, viewed in the abstract, might seem to favour the theory that this disease is endowed with a self-disseminating property; but, on the other hand, such would appear to be far out-balanced by many powerful facts: of these no little weight is due to the simple and well-authenticated truth, that a change of *locule* invariably and almost instantaneously arrests the destroyer in its progress, and that too without any bad consequences, as is well instanced in the above, and in the removal of the 33d and 22d detachments to Port Royal, where the royal artillery occupied the very same barrack, without suffering in the slightest degree." We have, in the circumstances just referred to respecting the 84th regiment, several points within a small compass, which should never be lost sight of in the consideration of such questions. The exemption of hospital attendants, in the following instance, will by many be probably ascribed to the circumstance of the building occupied as an hospital having been in a more healthy situation than that of the 84th regiment at Fort Augusta:—"I have now, however, the heart-felt satisfaction of stating that, from the 20th of June 1821, to the 20th of February, 1822, which includes the whole period of the sickly season, not one medical officer, white servant, or person employed in any capacity in the Naval Hospital* establishment, who had been attacked with yellow fever, or any species of fever."†

Dr. Bone has resided in the West Indies for many years, and has from time to time drawn up elaborate reports upon yellow fever, frequently referred to by the members of the department to which he belongs; it may, therefore, be stated, for the benefit of those in search of information on this subject, that he says, in the same report, "the first important result which I have proved in the Naval Hospital is that the *yellow fever*, as it is called, cannot by any possibility be communicated from one person to another." He states that thirty-five white servants had been employed, and concludes by observing, "So few in the West Indies believe the doctrine [contagion] that they may very safely be permitted to enjoy their own opinions: they cannot do much harm."

We cannot pass over the official statements of Mr. Hartle, deputy inspector-general of hospitals, who has served in

the West Indies through the various grades of the medical department of our army, during a period of more than thirty consecutive years. His report for 1822 contains particulars of a most interesting kind relative to the introduction (without subsequent diffusion of the disease) of many cases of the yellow fever into the island of Antigua: in one place he remarks, "It is a pleasing reflexion, and a source of great gratification to me, that, notwithstanding one hundred and seven cases of yellow fever, as distressing and malignant as any I have before witnessed, have been by three vessels imported into this island since September 1821, we have not a single instance of any individual but those directly exposed to the local causes [ships] having been attacked." He states that the sick received on shore from one of those ships (Dasher transport) were attended by Europeans. Mr. Hartle's account of the yellow fever on board the Pyramus frigate, which arrived in Kingston Harbour from Barbadoes, with many of her crew affected with the disease, on the 3d of January 1822, is highly important. The following are the principal facts recorded by this gentleman. Neither the officers nor men had been exposed to solar influence or other exciting causes. One of the principal reasons assigned for the breaking out of the disease was that this ship had been "injected with coal-tar, which, with bilgewater, caused remarkable effluvia." The only ships on the station injected with coal-tar were the above, the Esk sloop of war, and Dasher transport, "all of which suffered, the former and latter especially, with a similar type of disease, yellow fever, in its most malignant form." He states that the crew of the Pyramus were landed and the ship dismantled. When the limber-boards were removed, the effluvia from the hold surpassed every thing which he had "ever before experienced." A boatswain looking into the hold from the lower deck, while an inspection by proper officers was going on, fainted, and passed afterwards through a formidable attack of the disease. Mr. Hartle himself, who was one of the officers appointed to examine into the state of the ship, escaped with slight indisposition. This gentleman states, respecting the others, that "every individual present at the opening of the holds and limber-boards was attacked by the prevailing disease." Although the frigate had been only six months from England, and was believed to have been a short time out of dock, four large mud-boats of filth were removed from her at Antigua, which was nine inches in depth in the hold. The negroes employed in removing this mass were obliged to go on deck occasionally, so insufferable was the stench, and three of them had the characteristic disease. The after-magazine, immediately under the gun-room, was found in the worst state, and this accounted, in the opinion of Mr. Hartle, for every officer's servant and servant of the gun-room mess having suffered. Objections hav-

* A splendid establishment, appropriated for some years past to the accommodation of the sick of the army.

† Official report from Dr. Bone, deputy-inspector-general of hospitals, Barbadoes.

ing been made to the removal of the crew beyond the dock-yard, after their landing on the 15th, several cases occurred up to the 30th, in consequence, as was discovered, of the men having gone on board clandestinely; the crew were therefore encamped at some distance from the dock-yard, while a cleansing and thorough purification took place; and, on returning on board, their general state of health continued good.

Within the last few years much valuable information upon yellow fever has been from time to time furnished by Dr. W. Fergusson, inspector-general of hospitals; and it is to be regretted that want of space precludes the possibility of extracting, as freely as would be desirable, from documents furnished by a gentleman of such great experience, tact, and candour. His paper in the eighth volume of the *Medical Chirurgical Transactions* is particularly interesting, and refers chiefly to transactions which occurred while he was principal medical officer in the West Indies, in 1816, &c. Dr. Fergusson is quite adverse to the doctrine of contagion in yellow fever; and it will be admitted, as we conceive, that the facts which he has adduced in the paper just mentioned, are calculated of themselves to make a powerful impression. He shews that, without restraint as to intercourse, situation alone has given great comparative exemption from yellow fever to raw soldiers from England over civilians; that the disease "is confined, in all the islands, to the sea-coast;" and that, "at Barbadoes, our hospitals, of late years, have been in a regular course of importation of the yellow fever from the navy; but not even inoculation has been able to produce the disease upon any member of the hospital corps, by whom I may truly say that the sick have been received with open arms; for the anti-social doctrines of ideal contagions are not preached among us here, to the prejudice of duty and humanity." Speaking of the general impression at St. Domingo, on the subject of contagion, during our occupation of that island, he says, "I never even heard the idea started, nor do I recollect a single precaution, advice, or observation, that acknowledged the existence of contagion, ever being directed to the medical staff from any quarter. I appeal to the writings of Dr. McLean, the living evidence of Mr. Weir, Dr. Jackson, Drs. Theodore Gordon, Borland, Inspector Warren, and all the medical officers who served there to bear me out in this assertion. I appeal to the evidence of every medical officer now serving in the West Indies, that has ever had experience of the disease (for there may very probably be found contagionists among those who never saw it) to say whether in their lives they ever met with a case of yellow fever that could with greater feasibility be traced to personal communication with a subject labouring under the disease, than to the ordinary natural causes from which it has been proved to originate." Dr. Fergusson's remarks go to corroborate the curious fact occasionally to be found in authors

as to "different parts of the same town being differently affected; and so limited often is their influence, that one story of a house,* or one section of a ship, will be strongly affected by it, while other parts of the same tenements remain healthy." In the paper from which these extracts are taken, will be found details of the highest value relative to the disease in question, as it prevailed among the crew of the *Regalia* transport, employed in carrying black recruits from the coast of Guinea to the West Indies in 1816; and from which it appears that the crew were in good health previous to taking in many tons of green wood at Sierra Leone; that great sickness (chiefly dysentery) prevailed among the blacks during the voyage; and that several deaths took place; but the yellow fever was altogether confined to the crew; and, in the words of Dr. Fergusson, "the ship, on her arrival at Barbadoes, was not put under restraint or quarantine, but communicated freely with the sea-ports of Barbadoes, the Saints, Antigua, and Guadeloupe; landing the severally ill or dying subjects of that disease amongst the inhabitants, and at the hospitals at Barbadoes and Antigua, without communicating infection at any of these places; and finally, after having undergone a thorough purification, sailing from Guadeloupe for Europe, crowded to a very great degree with rebel French prisoners and their families from the jails, under the most dangerous circumstances of health, with a case of yellow fever actually dying on board the day before she left Basseterre roads, but without communicating any such fevers to the unfortunate passengers, leaving any behind her at Guadeloupe, or importing any at the ports she ultimately reached." Dr. Fergusson, when speaking of an epidemic which took place in the following year, says, "what a different interpretation the facts I have collected would have borne, had the present epidemic that afflicts the islands broke out in the ordinary course of the seasons, a year earlier, at the time the *Regalia* was here." We shall only offer one more extract: "At Martinique they established a strict quarantine, particularly directed against Guadeloupe, and they have been consumed with yellow fevers; but at Dominique, Tobago, St. Vincents, &c. where they established none at all, they have not had, in as far as I have learnt, a single case, although at the last-mentioned islands both the *Tigris* and *Childers* ships of war imported distinct well-marked instances of the

* At Gibraltar, during the epidemic of 1828, we observed this to have been the case in a very remarkable manner in some instances; and Dr. Ramsay, surgeon to the forces, states, in an official report dated Barbadoes, 20th December, 1825, that, "in certain barracks and hospitals the very diagonal of particular apartments will afford a tolerably accurate demarcation of safe and unsafe position of beds." See on this point also Dr. Wilson's work on yellow fever (1827), in which the disease is shewn to have been confined to men whose berths were on a particular side, or in a particular part of a ship.

disease from *Point au Pitre*, on the evacuation of Guadeloupe."

Previous to closing this sketch of the question of contagion as connected with the importation of yellow fever into our West India colonies, it may be worth while drawing attention to an extract of a letter from Mr. Showers, ten years colonial surgeon of Sierra Leone, the first being the very year (1816) in which the *Regalia* sailed from that place:—"During my ten years' stay at Sierra Leone I never saw any other fever, [the ordinary fever of the country;] but when a fever broke out there similar to the yellow fever of the West Indies,* attended with black vomit, which was supposed to have been brought there from the Mediterranean by a ship called the *Caroline*, this I recognised as a different fever from the one I have just described, from the common fever of the country; and to my knowledge none of the medical men then at Sierra Leone had any difficulty in distinguishing it as a new and different disease."† Mr. Showers adds, at the close of his letter, that respecting the fever of 1823, he had "his doubts whether it was imported or contagious; I am much of opinion that it proceeded from the atmosphere;" which doubts he was the more justified in entertaining from the known fact that for two years previous no yellow fever epidemic existed at any port in the Mediterranean. To those who had been led to believe that the true black-vomit fever had been not unfrequently exported from the coast of West Africa, its reputed birth-place, this visitation as a perfect stranger, and its alleged importation from Europe, must appear somewhat strange. The healthy state of the *Regalia* transport previous to her sailing from Sierra Leone, together with what appears by Mr. Showers' letter as to the non-existence of the yellow fever there in 1816, would seem to favour Dr. Fergusson's idea of its having been produced by the great quantity of green wood‡ just laid in previous to her sailing, and to "foul ballasting that had not been changed for years." However it may affect the question of contagion, it would, considering the mass of evidence now before the public from various sources, be quite idle to deny the spontaneous breaking out of yellow fever on board of ships in the West Indies, and, more rarely, in other places: one of the best authenticated instances is that of the *Bedford*, seventy-four, in Gibraltar-Bay, so far back as 1794, of which there are official records at Somerset House. In that year yellow fever was not prevalent in the garrison, and the crew arrived in perfect health from the Mediterranean on the 24th of August. On Sunday the 6th of September, the crew having been mustered,

* The year 1823 is here referred to.

† See Mr. Showers' Letter, dated Malta, 27th July, 1830, in Dr. Aiton's *Dissertations on Malaria*, &c. 1832.

‡ In the official report of Mr. Hartle, lately referred to, it is stated, on the authority of Mr. Mortimer of the Royal Navy, that the *Nayden* frigate having taken in green wood at Dominica, lost one-third of her crew by fever.

every man answered to his name; but in the course of the week one hundred and thirty were sent to the hospital, with fever possessing the characteristic symptoms: eleven died before the 24th of September, and others were left dangerously ill on the departure of the ship that day. In this case the only feasible cause assigned was the shifting of the shingle ballast, after the ship arrived, with the object of *trimming* her. The disease did not extend beyond the sailors of this ship. The fact, (considered at one time as an indubitable proof of the propagation by contagion,) of the sailors of the British brig of war *Carnation* having been attacked with the disease when put on board the French brig *Palinure*, by which she was captured, near Martinique, in 1808, as stated in the *Dictionnaire des Sciences Médicales*, would admit of the explanation of their having, in common with the previous cases existing in the *Palinure*, originated from sources within this ship, and independently of persons. The following is among the most recent instances of the spontaneous irruption of black-vomit fever on board ship. His Majesty's ship *Blossom* had been for some time employed in the summer of 1830 in surveying the Honduras coast; and in the month of August the disease commenced, which obliged the captain to go into Belise harbour, to obtain medical assistance from the garrison, into the military hospital of which forty-eight cases were received between the 11th and 30th of August: two officers and eight men died, and "these cases were attended with black vomit," according to the gentleman who had charge of them, assistant-surgeon Watts, of the second West India regiment, who had previously served in Jamaica, and who forwarded notes of the circumstances in his official return to the Army Medical Board for the quarter ending the 24th of September, 1830. Mr. Watts adds that the disease did not extend to the other ships, or to persons on shore. In a report from Dr. Lindsay, surgeon of the *Blossom*, to the heads of his department, relative to the event in question, he says, "I am of opinion that the cause of the present illness arose in the ship herself." Among the naval surgeons of the present day, of practical knowledge in this disease, we do not find many supporters of the doctrine of contagion; and among the observations on this point published of late years, Dr. Wilson's stand pre-eminent. The following from Mr. Mortimer, while serving as principal naval medical officer at Barbadoes, are forcible: "We do not allow the fever of the West Indies, commonly called 'yellow fever,' to be at all infectious in any of its forms or stages. We have never known of an instance of its communication to patients at the several naval hospitals, whilst under cure for other complaints, though such patients have never been interdicted, on the contrary encouraged to offer every additional aid for the greater comfort of their suffering brethren."*

* See Communication to Commissioners of Transports,—*Med. Chir. Rev.* vol. viii.

Passing now to the American continent, our limits admit but of a few brief remarks. Up to the year 1793, almost all the medical men in the United States were believers in the communicable nature of yellow fever; but each successive epidemic diminished the numbers, so that in 1825, according to an American commercial almanack, while five hundred and sixty-seven were against the doctrine of contagion, twenty-eight only remained in favour of it, throughout the whole country; the latter number being in all probability now reduced, as some of those mentioned were very aged. The public manner in which the celebrated Dr. Rush, once a believer in contagion, retracted his opinion, after farther observation, is matter of historical notoriety. At New York the doctrine of contagion is still ardently supported by two physicians in particular,—Professor Hossack and Dr. Townsend, who have both written much upon the disease. The facts which presented themselves to Dr. Beck in the course of the last epidemic at New York (1822), caused his public retraction of faith as to contagion in the following year;* and Dr. Townsend appears to have admitted† that, of about two hundred persons of all grades of the profession in that city, three or four only believed lately in the transmissible nature of yellow fever. “In 1793 the profession were almost unanimous in the belief of its contagious character, and no little courage was required to brave the storm an opposite opinion would have awakened. In this generation an equal unanimity prevails in the profession as to the non-contagious nature of the disease; and he who advances the opposite doctrine seriously, is deemed no more worthy of notice, much less a refutation, than would be an advocate at this time of the Ptolemaic system.”‡ Upon this highly important question, the following unpublished statement from the pen of M. La Roche, French consul at Philadelphia, cannot but be important: it is extracted from a letter, which we have had in our possession, to a friend of his in Paris, dated the 20th of July, 1830. “A friend of mine, Dr. Morrel, has lately arrived from the Havannah. During a few days’ passage three persons died of yellow fever on board, and a fourth, taken ill on board, died in the New York quarantine establishment. The sick were all *cabin passengers*, and received the germs of the fever in the port. The other passengers, who merely embarked at the moment of departure, without having waited in port, remained well, and that notwithstanding the inevitable contact arising from twelve or fifteen persons sleeping in a small cabin. Dr. Morrel and the other passengers were placed in quarantine, but during the time every body went to see them.”

Much interesting matter relative to the evi-

dence on the subject of contagion in the yellow-fever epidemics which have from time to time prevailed in America, may be obtained by consulting various pamphlets published by Dr. Chervin of Paris, who has made the subject of yellow fever his particular study for many years of his life. In those pamphlets will be found evidence of zeal in the cause of science quite unparalleled, as well as of impartiality in his proceedings in search of truth. It is quite impossible, in the present day, to meet the subject of contagion of yellow fever fully, without a knowledge of the nature and extent of his researches. Here, with a view of shewing their value, we may give a few extracts from the commission appointed by the Academy of Sciences in Paris, in 1827, to adjudge the prize designed for labours in medical science. The *commissaires* were MM. Portal, Boyer, Chaptal, Dumeril, Dulong, Gay-Lussac, de Blainville, Frederic Cuvier, and Majendie.

The report made by the above gentlemen, after stating some unusual steps taken by Dr. Chervin to ascertain the contagious or non-contagious nature of the yellow fever at Guadaloupe, to which place he had proceeded from Paris, for the sole purpose of making investigations, proceeds thus:—“This is nothing!—It was, on the contrary, then that Dr. Chervin conceived the wisest and vastest plan that ever a medical man formed for the interests of humanity.

“It was no longer sufficient for him that he had satisfied himself that the yellow fever was not contagious in Guadaloupe; it became necessary to ascertain whether it did not possess that character in other localities and in other latitudes and climates. It was above all things necessary to convince the governments of Europe, so that commerce might be freed from unnecessary precautions, felt to be burthensome, and that nations might be saved great expense in sanitary establishments. In attaining his object, Dr. Chervin was only impelled by his ardent philanthropy—no other means, but the sacrifice of his patrimony—no support but his own inclination and physical powers—let it be declared, to the honour of humanity, that by such means alone enterprises of this kind could be accomplished; and in fact, what a powerful government could scarcely hope to obtain at great expense, Dr. Chervin proposed to himself to obtain.

“Dr. Chervin performed this gigantic undertaking, to which the history of medicine furnishes no parallel, in a fortunate manner, but with unheard-of efforts, and perseverance above all praise.”

Speaking of his having collected the evidence of hundreds of medical men in all parts of the world where the yellow fever is known to prevail, the report continues—“He visited, in eight years, all the colonies belonging to France, England, Spain, Holland, Denmark, Sweden: he visited all parts of North America, where the yellow fever has shewn itself, from New Orleans to Portland, in the state of Maine; so that from Cayenne to this last place he tra-

* New York Med. and Ph. Journ., No. viii. p. 472.

† Chervin. De l’Opinion des Médecins Américains, p. 11.

‡ See Amer. Journ. of Medical Sciences, August, 1829, p. 523.

versed over and made investigations in 37 degrees of latitude."

"It [the commission] therefore proposes to adjudge him a prize of 10,000 francs: undoubtedly a poor reward for the many sacrifices which he must have made; but when a person has, like Dr. Chervin, merited so much from science and humanity, and shewn such disinterestedness, *on voit la couronne et non pas sa valeur.*"

In a work of high character* Dr. Chervin's labours in the cause of truth are thus alluded to: "Observe, in regard to this last subject, [viz. the error of attributing to contagion what should be referred to local causes,] what occurred respecting the yellow-fever epidemic of 1821, in the unfortunate city of Barcelona. Read the work of the French Medical Commission† appointed to examine into that epidemic, and it will be impossible for you (admitting as true the statements therein contained) not to admit the existence of contagion. But afterwards, when you have read the precious documents collected by Dr. Chervin with a degree of zeal and patience truly admirable, you will rest convinced that the circumstances which led you to be of the same opinion with the commissioners as to the reality of contagion, are any thing but conclusive; thenceforward the idea of contagion will be effaced from your mind, *comme un vain songe*; and, pressed on every side by the evidence of observations, you will be compelled to attribute to *local infection*‡ those circumstances which, misled by inaccurate statements, you had placed to the account of contagion."

That in North America the disease has not been propagated by the removal of persons labouring under it, even when carrying with them their bedding, &c. has been shewn by observations made there during many years by medical men (some even professed contagionists), in instances of upwards of thirty cities and towns, according to a report upon Dr. Chervin's documents, read at the Academy. By those documents it also appears that attendants of all classes on yellow-fever patients constantly remained exempt from the disease in that country, *where the hospitals were placed out of particular local influences*. This it appears was the case at the hospital at Bush-hill, near Philadelphia; in that of Belle-vue, near Fort Stephens; in that of the navy at New York; also in those of Norfolk, Baltimore, Providence, Newport, Boston, and New London. These most important facts are verified by Drs. Chapman, Redmond, Cox, Mease, Lehman, Mitchell, Parish, Jackson, Perkin, Miller, Tucker, Thomas, Backe, Harlon, Coates, &c. of Philadelphia; by Drs. Anderson, Brown, Walker,

Drake, and Osborne, of New York; by Dr. Archer, of Norfolk; by Dr. McCauley, of Baltimore; by Dr. Weaton, of Providence; by Drs. Turner and Waring, of Newport; by Dr. Townsend, of Boston, and Dr. Lee, of New London. Proofs to the same effect, collected in the West Indies, were laid before the Academy in 1827, by Dr. Chervin.

Dr. Pariset, medical chief of the quarantine department in France, has admitted that the yellow fever "is not contagious in America,—whether it had ever been so, or has ceased to possess that property."*

With respect to South America, the points bearing upon this part of our subject have perhaps been more fully entered upon by Humboldt than by any other person. In his Political Essay, (vol. iv.) he mentions that at Vera Cruz the idea of the importation of the disease from the Havannah and other places had been from time to time entertained; but by the facts which he furnishes, there seems to be no reasonable cause for doubt as to the disease being indigenous at the former place. The subject of contagion is investigated by this celebrated man in the spirit of philosophy for which he is so remarkable: we are shewn by him to what an extent one test of the communicable nature of a disease—that of taking people, actually ill of a disease, into healthy districts—has been applied, and the result proved to be entirely against the doctrine; that not only at Xalapa, and higher up in the interior, but at the farm of Eucero, a short distance from Vera Cruz, the disease is found to confine itself to the persons of those who may arrive with it in their systems from the latter place, notwithstanding the freest intercourse with others. Every observation made by Humboldt throughout his works, relative to yellow fever, is of high interest: one seems peculiarly deserving of attention; which is, that although the disease usually prevails among the newly arrived every year at Vera Cruz, it never prevailed epidemically there between 1776 and 1794, although the intercourse with the Havannah and other places where the disease continued to prevail, was quite free. He even says that during the eight years preceding 1794, "there was not a single example of the *vomito*, although the concourse of Europeans and Mexicans from the interior was extremely great, and the sailors gave themselves up to the same excesses which are now laid to their charge."† Such a fact is the more worthy of notice, as it does not appear to have depended on unusual atmospheric states during this period; and one can scarcely concede any very great degree of importance to the circumstance of the streets of that city having been for the first time paved in the year

* Dictionnaire de la Médecine et de Chirurgie, vol. v. article *Contagion*.

† At the head of which was, be it remembered, Mons. Pariset, Medical Chief of the Quarantine Department.

‡ We know that in France the word *infection* is exclusively applied to *places*, not to transmission of a disease, directly or indirectly, from person to person.

* "N'est point contagieuse en Amérique, soit qu'elle ne l'ait jamais été, soit qu'elle ait cessé de l'être." Bulletin des Sciences Méd., tom. xii. p. 126.

† Political Essay on the Kingdom of New Spain, vol. iv. p. 194. Dariste, who practised in Martinique for some years, informs us of a similar exemption at that island between the years 1807 and 1816; and that old inhabitants remarked intervals of even twenty-five years between epidemics.

1775, seeing that the disease has recurred so often since 1794, and has prevailed so frequently in the well-paved streets of St. Pierre Martinique, of Cadiz, Seville, Gibraltar, &c.

To turn now to a view of the question as to whether this disease has been proved in Spain to have possessed the property of propagating itself from person to person, immediately or mediately, it appears that so far back as 1761, (21st October,) a royal edict was issued at Madrid, which set forth that all experience of the intercourse between the Havannah and Cadiz had proved that the black-vomit fever was not contagious. It would appear from this that the opinion of the court physician Cervo, sent to inquire into the nature of the Cadiz epidemics of 1730 and 1731, had been more regarded than that of Navarette, who attributed their origin to importation from America. It seems very curious that the late Dr. Arejula of Cadiz should, when he wrote his work on yellow fever in 1806, and which is so valuable in many respects, have laboured under the great error of the black-vomit disease of the Havannah, Vera Cruz, &c. being a different disease from that now so generally known by the name of yellow fever, and admitted to be identical. He appears in the strange dilemma of contending for the contagion and importation of the disease under one denomination, (*yellow fever*,) while he admits freely that in America "a succession of ages proved to the medical men that the disease was not communicable:"—and speaking of Spain, that "our ships never brought the germs of the black-vomit, even though they had the disease on board when leaving our possessions." This physician, with Drs. Coll and Amellor, also of Cadiz, made a declaration that the medical men commissioned to inquire into the causes of the epidemics of 1732 and 1734, pronounced it not to have been propagated by contagion. In all subsequent epidemics, a great majority of the Spanish practitioners have favoured the doctrine of importation and contagion; but it would appear from the assertion of Professor Salva of Barcelona, in his *Trozos ineditos*, that the public opinions of some had been influenced by political or other causes, for he does not hesitate to state, that when with a view to illustrate the subject of the contagion of yellow fever, he applied for information, private opinions as to its not possessing that property were obtained from some of those who had publicly declared the contrary. A commission, instituted at Cadiz to inquire into the origin of the epidemic of 1810 in that city, declared that in none of the six epidemics which had appeared previous to 1805, could the origin of the disease be traced.* The importation of the disease allowed to by the commission as having taken place in

1805, had reference to the disembarkation of about two hundred cases from the fleet of Admiral Gravina on its arrival from the West Indies. The commission admit that though many of the cases had the most characteristic symptoms, and though the communication with the city was completely free, "the disease did not spread, nor was it in any way communicated." It is also stated that though many cases were sent to the Aguada Hospital at Cadiz from a French fleet in 1807, with which a free communication was permitted, the disease did not spread. In addition to the authorities cited at the commencement of the present subject, many details connected with the origin of yellow-fever epidemics in Spain up to the year 1820, and which cannot possibly be entered upon in detail here, are to be found in Hurtado's "*Nueva Monografia*;" in his "*Decadas*;" in Mr. Doughty's book; in the writings of Dr. Pariset; and in various pamphlets published in Paris since 1827 by Dr. Chervin.

Regarding Gibraltar in particular, we may be allowed to state that a residence there within the last few years brought us into frequent contact with a gentleman who had been present during the existence of the disease in the years 1810, 13, and 14,—Mr. Amiel, many years on the medical staff of Gibraltar, and now surgeon to the 12th regiment. The evidence of this gentleman, comprising the fullest details upon every point, goes to refute the statements made regarding the importation of the disease at any of the periods in question, and is fully corroborative of the evidence upon the subject placed before the public by Sir W. Burnett and Dr. Bancroft. The only forms in which Mr. Amiel's statements have come before the public are, a short memoir printed at Gibraltar, and a paper to be found in the Edinburgh Medical and Surgical Journal for April 1831. We have been assured by him that the impression given* by the present superintendent of quarantine in this country, as to the disease having been cut short in 1810 by his recommendation of segregating the cases, is utterly fallacious; for, as has also been specially certified to us by Dr. Bobabilla, another practitioner resident during many years in Gibraltar, the progress of the disease was stopped, *as it is always found to be*, by the setting in of a cold wind from the north. It must be obvious that placing a point like this on its true footing is of the highest importance to the public. Notwithstanding the body of evidence on record against contagion in all the Gibraltar yellow-fever epidemics up to the year 1814, and though from Bancroft's works it appears that among the medical men of that garrison the majority of opinions had been greatly against it, it was nevertheless impossible that unbiassed persons should be uninfluenced by the statements published by two officers of the quarantine department,† who, having been on the spot, had ample opportunities of arriving at the truth on

* "En ninguna de estas epocas, exceptuada la de 1805 en que vino de fuera, se ha podido averiguar con exactitud, el origen de esta calamidad publica." "At none of these periods, except 1805, (in which it was imported) could the origin of this public calamity be determined with exactness." *Extract from the Report of the Commission.*

* See Pym on the "Bulam" Fever.

† Ibid.—Fraser's (W. W.) Letter to Lord Chatham.

such points. The circumstance here alluded to is the assertion that, during the epidemic of 1813 at Gibraltar, the people employed in the dock-yard there, having been strictly separated from the rest of the garrison, remained free from the disease. Here, then, was evidence fully in support of the utility of quarantines, and of the propriety of separating, on future occasions, the healthy from the sick. But what was the astonishment of the profession on finding that mis-statements had here taken the place of facts, as shewn by Dr. O'Halloran,* who had served in a regiment at Gibraltar for some years subsequent to the period. During a residence at Gibraltar, we had ample means, by referring to the declarations of the official authorities at the dock-yard, of confirming the assertion of Dr. O'Halloran as to several cases of the fever prevalent in 1813 having occurred there, as well as some deaths; indeed the names of twenty-three (of which seven proved fatal) could be here given were it necessary: so that regarding the original statements, no impressions favourable to the accuracy or candour of the quarantine officers who made them can be entertained; and in the justly severe remarks of Dr. O'Halloran on the subject, to which no reply has been made, future observers of circumstances connected with the public interest have received a salutary warning.

The terrific epidemic of 1831 at Barcelona gave a new impulse to the question of the contagion of yellow fever. The statements furnished by the medical commission sent from France† to make researches into the nature and origin of that disease, left a strong impression on the minds of many in the profession favourable to its possessing a communicable property; and the "*Histoire Médicale*" displays literary powers of a high order on the part of Dr. Pariset, who was at the head of the commission. The same gentleman, however, (Dr. Chervin,) who had devoted so much time and labour, as already shewn, in procuring authentic information in the West Indies and America relative to the question of the transmissible nature of the yellow fever, followed Dr. Pariset step by step some time after, not only at Barcelona, but through all parts of Spain where circumstances had been detailed respecting the propagation of the disease. The result has been,—not a mere series of assertions against assertions,—but a collection of documents duly authenticated, such as had never before been laid before the public on any question of this kind. As elucidating a long-pending question of high importance to society, their value may be judged of from the opinion of the Academy of Medicine, which has been already referred to. We regret that space will not permit our furnishing many valuable extracts from the works of this gentleman, pub-

lished in 1827 and 1828.* We are furnished with the statements of Dr. Pariset and others regarding a multiplicity of events connected with the appearance and progress of the yellow-fever epidemics of Spain; and it cannot but be admitted, we think, that Dr. Chervin has shewn, in a manner the most conclusive, that many inaccuracies had crept into those statements, and that the events warranted conclusions quite opposite to those which had been come to. Dr. O'Halloran, who went to Barcelona to observe the epidemic of 1821, had, previously to Dr. Chervin's visit there, pointed out some of the most important errors of Dr. Pariset; and in his book, already referred to, some interesting statements are furnished relative to occurrences at other points.

An event very remarkable in the history of yellow fever, and but little spoken of in England, occurred in 1823 at the little port of Passages in the province of Guypuscoa, a place well known to many British naval and military officers, it having been the rendezvous for transports while the British troops occupied the Pyrennees in 1813-14. It is difficult to give an idea of this singular port, situated at the bottom of the Bay of Biscay, and forming a sort of appendage to St. Sebastian's, from which it is distant but a very short way. The entrance is between precipitous rocks, and is so narrow and oblique as to be with difficulty discoverable at a very short distance. This miniature town consists for the most part of one small street, placed as it were on a shelf of scarped rock, and so narrow that it does not admit of the passage of carts or horses, while the rock forming the base of the mountain of Olearso is in some places literally in contact with the houses, which are badly ventilated, filthy, dark, and crowded. Let us take the events in question from the account given of them by Dr. Arruti, a physician long resident in that part of the country, and who, while he would lead us to believe in some places that he considered the disease within certain points contagious, yet relates the facts which took place under his observation with such perspicuity and candour, that it is impossible to perceive the smallest intention on his part to mislead. We are informed that, in June 1823, a brig named Donostiarra sailed from the Havannah with a clean bill of health; and that, having lost one man on her voyage, (from ordinary disease as far as was known,) she obtained pratique in the usual way at Corunna, after ten days' quarantine. She subsequently put into St. Andero, and arrived at

* O'Halloran on the Yellow Fever of Spain, p. 168.

† Dr. Pariset, medical chief of the quarantine department, with Drs. François and Bally. This is not an occasion to enter on the alleged political motives by which this commission might have been influenced, with a view to favouring the adoption of the famous *cordon sanitaire*, previous to the invasion of Spain in 1822.

* In the "*Revue Critique*" by Dr. de Fermon of Paris, printed in 1829, a *resumé* of the occurrences here spoken of may be found.—Dr. Reider of Vienna, who has also made yellow fever the subject of particular investigation, and undertook, for the purpose, voyages at different times to the West India Islands and the American continent, states, in a memoir published at Vienna in 1828, that the disease "was never imported into Europe or anywhere else;" and that "it never originates in, or is propagated by contagion." He deploras the manner in which governments are misled, and the best interests of humanity sacrificed, by those who endeavour to maintain the present system of quarantine.

Passages on the 3d of August, with all on board in perfect health. This vessel had been latterly employed in the trade of these ports. As she had been at Corunna and St. Andero previous to her arrival at Passages at the date just mentioned, she was not put into quarantine at the latter place. The cargo, consisting chiefly of sugar and tobacco, was discharged soon after her arrival; and for several days a great many people of all classes went on board, but without any disease having broken out among those individuals, among the crew, or in the part of the town where the cargo had been deposited. On the 15th, a custom-house officer, who had been several days on board, was taken ill, and he died on the third day, black-vomit having appeared. This man was said to have been much engaged in the hold looking after contraband goods. On the 22nd, a man who had been down for some time in the hold surveying the ship's timbers, likewise died. Some of the planks of one of this vessel's sides having been found greatly decayed, twelve carpenters were employed in removing them, and six of the twelve were attacked in quick succession. The opening in the side of the ship commenced on the 19th, and on the 23d the disease began to appear in an unequivocal form in the houses close to which she was moored. Dr. Arrutti proceeds to shew in *detail*, and in the most satisfactory manner, that the disease did not extend beyond a certain number of houses at or near the *Plazuela de la piedad*, opposite the ship; that where others were attacked whose habitations were at a distance, it was occasioned by their having remained for some time within the space to which the malaria from the ship appears to have been limited, and the names and occupations of those persons are given. The heat was excessive in the middle of September, being, as he states, $28\frac{1}{2}^{\circ}$ Reaumur, (about 96° Fahr.,) and the course of the wind favoured the conveyance of the noxious emanations from the ship to the houses near it: he gives the number of each house in which persons were attacked, and names the points beyond them to which individuals labouring under the disease went, and where, notwithstanding the adjuncts of *crowded, filthy, and badly-ventilated habitations*, the disease did not spread beyond the individual: for, as he says, "whether they died or recovered, to none out of the focus was the disease communicated."* In the same page he says, "The inhabitants of Passages took the precaution of not making long delays in the focus of infection; they visited their relatives and friends, and performed towards them all the rights demanded by humanity and society, and the disease became extinct almost in its very origin." He observes, "It therefore results that this fever, examined according to the character it presents, does not offer a character of contagion from individuals."† And again, "It was afterwards discovered that many, evading the sanitary regulations, passed out without certificates of health, and took with them clothes, even from the houses where people had died; but notwithstanding this,

there was not the least spreading of the disease in the neighbouring country. If any deaths took place in Loyola, Renteria, or elsewhere, the disease in such cases had been contracted within the focus of infection." Finally, Dr. Arrutti observes, "If this disease had been transmissible by individual contact, what could have put a stop to its progress?—no human power: for the people who had been in the closest contact with sick, convalescents, and clothes belonging to the sick, distributed themselves, when the cordon was about to be placed, at St. Jean de Luz, St. Sebastian's, Bayonne, and other places." Here then, as we are necessarily obliged to conclude, is an instance—not of yellow fever imported,—nor, rigidly, of the cause of yellow fever imported, but a development of the disease by the concurrence of a certain number of agents. On other occasions yellow fever has been observed not to break out until vessels had been cleared of their cargoes; and in this instance the great heat which is stated to have occurred, reverberated as it must have been from the mass of rock close to which the lightened ship was moored, may be easily understood as having been highly favourable to the extrication of a noxious principle from her decayed planks.* In another account of this epidemic, given by Dr. Montes in the 14th vol. of *Hurtado's Decadas*, its origin is attributed to sources within the town itself, and totally independent of the ship, as publicly declared at the time by Dr. Zeubeldia; and that a similar epidemic prevailed there in 1780.† There is no discrepancy, however, in the statements as to the disease not having been propagated from person to person; though, as before intimated, Dr. Arrutti seems to apply the word contagion‡ to the extension of the disease within the limits of the noxious emanations from the ship. It appears that no inspection, such as took place in the case of the *Pyramus*, had been instituted here. From Dr. Arrutti's statements we can now comprehend the possibility of some fever cases having occurred among the men of this last ship, while they were living in the

* The origin of this disease at Passages, from sources on board unconnected with the death of the individual during the voyage, has been, on one occasion at least, admitted by Dr. Audouard of Paris, a professed contagionist.—See *Revue Médicale*, Sept. 1824, p. 38.

† We were not aware that yellow fever had appeared at any other point on this part of the Spanish coast, till looking over lately the official report from Dr. Bone already referred to. This gentleman says, "At St. Ander, in 1813, none of my assistants, orderlies, [army attendants on sick,] or nurses, employed with the cases of yellow fever treated in the *Casa blanca* in the quarantine hospital, were attacked with it."

‡ We had been long in communication at Gibraltar with a Spanish practitioner of great experience, (Dr. Bobadilla) and considered him for some time a believer in contagion, in the sense of direct or indirect transmission of a disease from one person to another; but to our surprise he assured us, that, at an hospital in Los Barrios near Gibraltar, some years ago, he explained to every body how the attendants of all classes on yellow-fever patients were not more liable than others to attacks.

dock-yard at Antigua, even without their having, as stated, gone on board secretly.

As, in the same year in which the above occurrences took place at Passages, another remarkable circumstance occurred, which has been frequently alluded to, it may be here mentioned, previously to referring to the events connected with the subject of contagion in the last epidemic to be noticed.

By an official report drawn up and published in 1824, by Dr. (now Sir William) Burnett, one of the commissioners of the Medical Department of His Majesty's Navy, it appears that in the early part of the preceding year a fever made its appearance at Sierra Leone in a form different from the usual remittents of the country, and stated to possess symptoms characteristic of yellow fever. The importation of this disease by the merchant-ship *Caroline*, as at one time alleged, is completely refuted in this report; and at page 24 an extract of an official document from the gentleman at the head of the medical department at Sierra Leone is given, in which it is stated, that from all the evidence which could be procured in the colony, there was reason to conclude that the disease was *non-contagious*. A curious circumstance, to which there is perhaps no parallel on record except that which, as formerly stated, occurred under our own observation in the West Indies in 1801, is related by this gentleman, viz. "that European females and children were perfectly exempt."

Under date of the 23d December 1823, a statement was circulated through the army by Sir Gilbert Blane, calculated certainly more than any thing which had previously appeared to prove the importation and subsequent diffusion of yellow fever by persons labouring under it. It appears that His Majesty's sloop-of-war the *Bann* left Sierra Leone for the Island of Ascension at the latter end of March, 1823; that a malignant fever, of which several died, prevailed among her crew, during and for some time after the voyage; and that, on the eighteenth day after her anchoring at Ascension, a disease alleged to have been similar, and in some instances accompanied with black vomit and yellow skin, broke out in the small force composing the garrison of that island, which consisted of thirty-five individuals, officers and men of the marines and artillery, besides women and children. It appears by the details given in Sir William Burnett's report, that an error (of little importance perhaps) had crept into Sir Gilbert's statement regarding the perfect health of the crew of the *Bann* when she left Sierra Leone; but what is of very great importance has been omitted by the latter gentleman in his letter, though supplied in the very candid statements of the former,—viz. "On reference to the journals of medical officers who at different times had charge of the garrison before the appearance of the late epidemic, an abstract of which is in the Appendix, not only has dysentery and hepatitis been very prevalent, as well as occasional attacks of fever, but likewise a fever called the bilious remittent, in the year 1818, attacked almost every man on the island,

which the assistant-surgeon attributes to an unusually wet turtle-season, when the men are much exposed by watching at night to turn these animals. Moreover there is, in the journal of Mr. Robert Malcolm for 1818, a case of this disease, which commenced on the 1st of June, and terminated by death on the next day, with all the symptoms of yellow suffusion and black vomit, &c., which are said to characterize the yellow fever; and having shown this case to the surgeon of the *Bann*, now in London, he declares it to be exactly similar to the cases of fever which lately proved so fatal in the *Bann*, and amongst the marines at Ascension."* Here then, whatever might have been the nature of the disease which prevailed in the *Bann* and at Ascension in 1823, we have evidence of the existence of the same disease in the island, and about the same time of year, in 1818, without the remotest suspicion of its having been then imported. This, on the obvious principle that what may in one year happen on a small scale, may, from an extension of the cause, happen on a larger scale in another year, greatly enhances the force of the concluding part of Sir William Burnett's sixth position, "that a disease similar to the fever in the *Bann* might have prevailed in that island though the *Bann* never had any communication with it."† He tells us that "the principal medical officer at Sierra Leone has come to the same conclusion in his official report;" and we suspect that, closely investigated as questions respecting the present subject have lately been, and greatly augmented as the facts bearing upon the question of contagion have been within the last few years, the majority of the profession who have paid attention to yellow fever will be likely to come to the same conclusion, rather than admit as a *propter hoc* that which, as far as any evidence goes which has yet appeared, was simply a *post hoc*. Sir William, though favouring, under all the circumstances, the belief of the importation of the disease on the above occasion, candidly leaves the question open, and furnishes all the details within his reach, to enable the profession to form an opinion. He points out erroneous statements as to the particularly healthy state of the island from the period of our occupying it (1815) to the epidemic year 1823. He says, "Out of one hundred and thirty cases of disease which are recorded in these journals, twelve died and nineteen were invalided; and though perhaps all the fatal cases are inserted in the journals, it is well known that those documents seldom contain more than a third of the cases which actually occur." He tells us that, although, at the time of the arrival of the *Bann*, the little garrison was in good health, and that, according to the medical gentlemen in charge, although at a period immediately preceding this event "they were on the whole very healthy, yet they were by no means exempt from disease."‡ He admits "that after a most careful inquiry it is impossible to trace the fever in question

* Page 10.

† Page 52.

‡ Page 11.

directly from the Bann to any individual of the garrison of Ascension:”* and indeed it appears that the first person attacked with the characteristic symptoms was not one of those known to have been in the ship or in contact with the sick, but a boy, on the 11th of May, respecting whom “it is neither known nor believed that he had any nearer communication with the sick of the Bann than passing daily at no great distance from the tents to feed his father’s poultry, and he was never on board that ship.”† The tents here alluded to were, as pointed out by Sir William at page 5, occupied as an hospital for the accommodation of the sick from the Bann immediately on her arrival, and were situated at about five hundred yards from the garrison, and *all intercourse was interdicted*. He informs us that up to this time the restrictions on the intercourse between the ship and the garrison had not been much attended to, several individuals having been on board after the landing of the sick; but that from the time of the boy’s illness “every proper precaution was taken for preventing the extension of the disease to the outposts; notwithstanding which, six men, two women, and seven children were taken ill at Springs, but fortunately none at the Green Mountain, though one of the men belonging to that post had been on board the Bann at the sale before mentioned.” We shall only add that the surgeon of the Bann, “an excellent and intelligent officer,” ascribed the disease to the long stay of the ship in port at Sierra Leone, where the crew had been much exposed to the sun’s rays in re-fitting her rigging, &c.; and that when this vessel had been, in 1821, on the Jamaica station, a fever, with yellow skin and black vomit in some of the cases, appeared among a party of forty men, put on board for a passage, who had suffered imprisonment with hard labour at Panama for four months;‡ which disease, according to the surgeon’s journal, did not extend to the crew, nor could he “trace a single instance of disease to contagion,” although “the smallness of the vessel, and other circumstances, would not admit of a separation between the sick and ship’s crew.”

That there were, on a *prima facie* view of the irruption of the fever in Ascension, reasonable grounds for suspecting the agency of contagion, there cannot be a doubt; but, as may now be seen, it is far from being established by anything like legitimate induction from evidence, that the one was the cause of the other; and, added to all that is now known upon the subject of yellow fever, many will probably join with us in believing that, admitting the transmission of this disease from individuals in this instance, would be illogical and nothing short of admitting that to be *vrai* which is shown to be only *vraisemblable*.

We shall close this essay by referring to some of the facts bearing on the subject of contagion, as they occurred during the yel-

low-fever epidemic at Gibraltar in 1828,* when it fell to our lot to observe its rise, progress, and termination. For minute details, full of interest, we can confidently refer to what has since been published by the following gentlemen of unquestionable veracity:—Mr. Wilson,† attached for many years to the duties of the Civil Hospital at Gibraltar; Mr. Hugh Fraser,‡ in charge of the Civil Hospital for some years, having previously served there in the 12th regiment; Mr. Amiel,§ now surgeon to the 12th regiment, a gentleman who has been for more than thirty years in His Majesty’s service, and had witnessed the disease at Gibraltar in the former years specified, as well as sporadically on other occasions; Dr. Smith,|| surgeon to the 23d regiment; and Dr. Chervin,¶ one of the members of the medical commission which arrived at Gibraltar from Paris towards the close of the epidemic of 1828. Besides these, the French government has published a series of documents furnished by the medical commission, to which is appended, on the part of one of them (Dr. Chervin), a declaration that statements of some consequence, afterwards shown to have been erroneous, had obtained a place in the collection.

After having paid the utmost attention to every point connected with the first appearance and progress of the epidemic in question, it would be an utter dereliction of our duty towards the public, to attempt, under the guise of extreme candour, to cast unwarrantable doubts on the many important statements made by the gentlemen whose names are above given, in proof of the disease not having been imported, and of its not having, under any circumstances, been communicated from person to person: we are enabled, on the contrary, to declare that most of the important facts cited by those gentlemen in proof of non-contagion, were verified under our own observation while on the spot. A reference to some of the publications pointed out in the notes will show how individuals have been

* Here, as matter for future reference, a view of the mortality from yellow fever at Gibraltar is given for five years in which the disease appeared there to a remarkable extent, from 1804 inclusive.

Years	1804.	1810.	1813.	1814.	1828.
Military and their families . . .	869 ..	6 ..	391 ..	114 ..	507
Civilians . . .	4,864 ..	17 ..	508 ..	132 ..	1,170
Total . . .	5,733	23	899	246	1,677

† See papers in Nos. 352, 353, and 354 of the *Lancet*, which were translated into French and notes added by Dr. Chervin, in 1830.

‡ Papers in *London Medical and Physical Journal*, March, April, and May, 1831, and in *Medico-Chirurgical Journal*, January, 1831.

§ *Edinburgh Medical and Surgical Journal*, April, 1831.

|| *Edinburgh Medical and Surgical Journal*, No. 106.

¶ *Lettre à Monsieur le Docteur Monfalcon. Réponse à Monsieur le Docteur Lassus. Réponse à Monsieur Guyon. Lettres in the Gazette des Hôpitaux*, 27th August and 10th September, 1831.

* Page 53.

† Page 14.

‡ Page 47.

publicly denounced to the world as having garbled and distorted circumstances in a manner which must for ever hold them up to the indignation and contempt of the profession at large. Indeed we cannot but regret that usage will not permit, on an occasion like this, an exposure of the conduct of interested persons, whose foul labours were directed to pervert truth on a question upon which, for generations to come, the lives of thousands must depend, and for which they so well merit exposure and punishment.

At the commencement of the epidemic there were very few medical men in the garrison who could be called anti-contagionists. Conceiving that our then medical chief, the late Dr. Hennen, was disposed to make up his mind too soon against importation and contagion, some of us* wrote to him, indeed, confidentially, requesting that he would give further attention to the reports regarding the importation of the disease by a Swedish ship from the Havannah, called the Dygden; but an impartial consideration of all the facts which passed in evidence before us subsequently, left no doubts in our mind as to the cause, though mysterious in its essence, being of a strictly local nature. At the strangely-constituted board appointed at Gibraltar to enquire into the origin of the disease, and at which, to the astonishment of all who had read the works of Bancroft and Burnett, the present superintendent of quarantine in England was named president, much passed over which a veil must be drawn here; and we shall only place on record the full opinions of two of the members, they being certainly most entitled to weight with the public. Mr. Judge Howell says, "Upon a careful review of all the proceedings before this board, I am of opinion that the evidence brought forward has totally failed to prove that the late epidemic disease was introduced from any foreign source, either by the Swedish ship Dygden or by any other means; and I am further of opinion that the late epidemic had its origin in Gibraltar." Colonel Chapman, (now Major-General Sir Stephen Chapman, Governor of Bermuda) says, "Judging from the evidence produced before the board, the manner in which it has been given, together with the description of persons who have been brought forward as witnesses, I am decidedly of opinion that the late epidemic disease is of local origin. As to the importation of the late epidemic, I am of opinion that the attempts to prove the introduction of the disease, after months of previous inquiry, by those who wished to prove it, have totally failed." The latter part of this needs, we presume, no illustration. Three voices, including that of the president, were in favour of the importation of the disease; according to another member, it might have been from foreign and local causes conjoined; while the seventh (the captain of the port) declined, through delicacy, re-

cording an opinion.* On the above occasion the examinations of some of the medical gentlemen attached to the army were most imperfect, *the progress of the disease among the men under their charge not having been entered into; and several of them were not examined at all!*

That a local cause of yellow fever, unconnected with persons, was in operation through a certain space at Gibraltar, in the latter months of 1828, was amply demonstrated in every possible way in which such a point could be proved. To some of the most striking occurrences bearing on the subject we shall here revert, leaving, for want of space, many valuable details, as they have been furnished by the several gentlemen formerly referred to. The failure of proof as to the importation of the disease has been admitted by the army medical board in England, to whom a copy of all the proceedings of the Gibraltar commission was sent for examination. It was shown that the disease made its appearance exactly about the same time of year as on all preceding epidemics at Gibraltar and other parts of Spain;† and that, as on all former occasions, the morbid influence was limited to the western face of the rock, and to a small village (occupied by fishermen and by a small military post) situated at the base of the rock, on its eastern side. On the sandy plain called neutral ground, several thousand of the civil population, as well as three regiments of infantry and some sappers, were placed under canvas or in huts, soon after the epidemic made its appearance: on two plateaux, situated at different elevations on the southern extremity of the rock,‡ three other regiments, with a detachment of artillery, were also encamped. Although very great intercourse subsisted during several weeks between the places where the disease prevailed and the three points here specified; and though, up to the appearance of the last case, there were no measures in force which could be considered efficient in a disease avowedly contagious,—for medical men fresh from their full wards were daily in contact with the healthy persons in the camps,—still the disease did not attack the persons on the neutral ground, or on the plateaux, unless duty or occupation obliged them to pass certain limits, and respire, for a longer or shorter time, the atmosphere of particular localities—the part of the town itself, called the 24th district, being the most dangerous of any. If any cases had their origin beyond the points spoken of, they must have been very few in number, as among our army

* To show the facility, at any time, of falling into the error of assigning, as a cause of the Gibraltar fever, that which may be only a coincidence, the above gentleman laid before the board a document shewing that between 1814 and 1820, *eight hundred and forty-four ships had entered there from different countries where the disease is known to prevail.*

† The first cases usually appear in August, though *avant-coureurs* have been not unfrequently observed in July. On one occasion only, as far as we are aware of, has an epidemic appeared earlier in Spain—that at Malaga in 1804, which broke out in June.

‡ Windmill-hill and Europa-flats.

* Dr. Smith, 23d regiment, and the writer of this, surgeon at the time to the 43d Regiment: the letters here referred to were found in Dr. Hennen's office after his death.

medical friends at Gibraltar, by whom the point had been frequently discussed with us after the epidemic, scarcely a single well-authenticated case could be made out, among the military or their families, where an attack had taken place among those who had not entered the regions of malaria.*

The following facts have been placed on record relative to this epidemic; it will be perceived how far they are calculated to set at rest a question of prodigious importance to a great portion of mankind. With scarcely any exceptions, security from attacks was obtained by the military and civil part of the population at the three points of encampment mentioned, as well as on board of ships lying in the bay, to which many of the latter fled. It was shewn that, though many individuals who had been in close contact with the sick in the town, &c. had removed to camp, taking with them their bedding and some furniture, no spreading of the disease in the camps or huts took place. Up to about the 20th of October, the convalescents underwent no process of purification previous to their being sent from hospital to their respective camps. By reference to Mr. Hugh Fraser's papers it will be seen that this gentleman, who was surgeon to the civil hospital, had, for want of room, been obliged to discharge a great number of persons from that establishment before their convalescence had been well established,—some indeed with hemorrhage still from their mouths,—that several of these people took with them articles of bedding to the small tents and huts in which their relatives resided, without the disease having been transmitted to the latter. By Mr. Amiel we are shewn that his regiment (the 12th) became soon free from cases after they encamped on the neutral ground, a few only having occurred among men who may be supposed to have carried out the seeds of the disease in their systems;—that so long as this regiment sent no men into town on duty, no attacks took place; but when the town duty was resumed, cases again occurred, and exclusively among those men who had been so employed. He gives us the important fact, that “ninety-two women of that regiment, and one hundred and ninety children, who never were allowed to repass Bay-side barrier, continued perfectly healthy; and one woman only, (the armourer's wife) who, during the period, obtained leave to enter and stay a few days in the garrison, caught the fever and died of it. Several of these women passed the night in the same beds with their husbands, attacked with and labouring under the epidemic fever; and, besides, continued, as well as their numerous children, to use the same bedding, after the men had been removed to hospital; but in no instance was the disease contracted by the wife or the children after that full exposure.” Were we to point out one situation more calculated

than another to favour the transmission of a disease by personal contact, it would be that of several individuals living in the small space of a tent or hut; yet we see that, put to this test, there was no transmission. Dr. Smith, in his paper referred to, shews that in the 23d regiment, the disease, notwithstanding exposure to direct or indirect contact with the sick, was also confined to those who had been within certain bounds; and he exposes fallacies in certain statements relative to people on board vessels in the bay, whose safety, we can join him in averring, did not arise from their having been cut off from communication with persons or things from the town. In a regiment, (43d,) of which we had, on the occasion in question, the medical charge, we can aver that on summing up all the occurrences, the following clearly appeared:—that although our regular hospital servants had been greatly harassed at an early period of the epidemic by attendance on yellow-fever patients, none of them were attacked until nearly one month after the admission of the first case; not, indeed, until the disease had attacked individuals who were not employed in attendance on the sick, but lived on that part of the rock where the hospital* is situated;—that, in the course of the first month of the epidemic, a party of temporary attendants, consisting of from two to four, or more, was sent daily from a remote barrack or camp to do duty in the wards of the hospital for twenty-four hours; their employment absolutely comprised whatever can be conceived of the most assiduous nursing during the night as well as by day; and the result, according to an investigation made afterwards, was, that, in the first place, no greater proportion of the sixty-nine men (the total number so employed) had been attacked, than of the whole mass of the regiment which had not been on this service about the sick; and that, in the next place, any of them who happened to be attacked within a period of several weeks after, were ascertained to have been on duty (guards, &c.) within the points where the atmosphere was most deteriorated. Here, then, we have, in a manner, an *experimentum crucis*, on such a scale as cannot be denied to give it the highest importance in the eyes of the profession. We took the precaution to have the names of these sixty-nine men, together with other particulars, duly registered and verified by the adjutant of the regiment, in a document forwarded to the office of the colonial secretary in London. The next remarkable fact regarding attendants on the sick was, that of several medical men (six or seven of whom had but lately arrived at Gibraltar) employed at an hospital on Windmill-hill, and at another in a low situation near the neutral ground, not one suffered from the disease: the same immunity was extended to the servants employed at those points, among whom were some who, not having passed

* At one time the writer of this essay, not aware that this was found to have been so generally the case, gave it as his opinion officially, that the morbid principle might, during epidemics, occasionally affect persons a few hundred yards beyond the rock.

* A fine building, calculated for the accommodation, under ordinary circumstances, of the sick of five or six regiments,—situated at an elevation of one hundred feet on the S. W. part of the rock, near the entrance of the bay.

through former attacks, could not be said to have escaped on that account. We took great pains to procure the names of the women who washed for the sick of the army during the epidemic, and it can be confidently stated that the result of inquiry, as to the numbers attacked, was quite in opposition to the doctrine of the disease being communicated indirectly by means of articles of dress, &c. Another point to be considered is, whether immunity from attacks took place where pains had been taken to exclude all communication, direct and indirect, with the sick. At the dock-yard this did not, in 1828, prevent individuals from being attacked; neither did prisoners confined in solitary cells at the "Moorish Castle," situated within the walls of the town, escape attacks. We are aware, too, that among the private families on the western face of the rock, who took precaution by seclusion, cases also occurred. On the neutral ground, on Windmill-hill, on Europa-flats, as well as in ships in the bay, persons who thought proper to adopt precautions may be said to have escaped; but the same, we are quite sure, may be said of those who, *living there*, adopted no such precaution as shutting themselves up. The only step holding out security at Gibraltar or any where else, as is now so generally understood every where, and as had been practised many years ago in some parts of Spain, is to remove quickly from the malaria points; and this, according to all experience, would seem a measure eminently entitled to the appellation of *sanitary*.

The foregoing materials, drawn from sources so varied, will probably aid the profession at large in forming an opinion upon a long-agitated question.

(J. Gillkrest.)

FRAMBÆSIA.—See YAWS.

FUMIGATION.—See DISINFECTION.

FUNGUS HÆMATODES, (from *fungus*, a mushroom, and *αἱματώδης*, bloody;) a term proposed by Mr. Hey, of Leeds, in his work entitled "Practical Observations in Surgery," published in 1803; to distinguish the particular form of disease now about to be discussed, from cancer, an appellation under which writers, both ancient and modern, until the commencement of the present century, seem to have included every variety of ulcerative tumour which proved untractable in progress and malignant in nature. Unhappily these are features too characteristic of fungus hæmatodes to have eluded the general denomination; but the peculiarity of appearances thus designated must in all ages have attracted notice, and in the records of various writers it is impossible not to perceive that examples of what we now call fungus hæmatodes have been regarded as extraordinary cases of cancer, or instances of anomalous disease.

At the period when Mr. Hey suggested the consideration of fungus hæmatodes as a distinct disease, it appears that the observations of Mr. John Burns, published in his valuable work on Inflammation, in 1800, were unknown to him.

Mr. Burns treated of it under the title of *spongoid inflammation*. From Mr. Abernethy, in his classification of tumours, (Surgical Observations,) it has received the name of *medullary sarcoma*, since called by the French pathologists *tumeur encephaloïde, cerebriforme, carcinome sanglante, cancer mou*. Dr. Young has ranged it, in his system of nosology, as one of the two species of the genus carcinoma, viz. *C. spongiosum*; applying the term *C. scirrhosum* to that form of hard tumour which is characteristic of the disease commonly called cancer.

The appearances of the fungus hæmatodes, the circumstances attending its origin and progress in the human body, and the purposes of practical medicine, demand and fully justify its separate consideration. That our view, however, of the distinctive differences between it and cancer may be the more clear, we propose, in the first place, to shew the analogy of the two diseases, and by which they seem to have been confounded, avoiding altogether as useless any subtle disquisition on the subject of their original identity, which the present state of pathological knowledge does not entitle us even to discuss.

They are both apt to be manifested in persons apparently of the same temperament; to be evinced by the formation of a tumour in the same regions of the body; often to be traced to similar exciting causes; and in each often to arise spontaneously; to be prone to ulceration, and afterwards to discharge matter not purulent in its nature; both often bleeding profusely: cancer sometimes, like fungus hæmatodes, produces a fungous excrescence; and both generally alike contaminate the absorbent system: both are destructive of the neighbouring parts, of whatever nature the structure of such parts may be, and frequently affect several organs at the same time; both, also, it must be acknowledged, are most frequently untractable and destructive of life.

The history of fungus hæmatodes to the period we have mentioned of its separate consideration, must, it is obvious, be involved in that of cancer; but it is impossible at the present time to trace back the observations proper to this form of disease, with such a degree of accuracy as to assist us in its elucidation. The difficulty of defining fungus hæmatodes, like that of defining many other diseases, consists in the variability of its symptoms in its progress; and, therefore, to the recorded histories of it we must refer for that information which is essential to its being well understood. The part, too, in which it is developed, the state of the constitution, and the age of the individual, are so many other causes of variety in its appearance. But the advantages of a concise definition are too obvious to deter us from hazarding such a one as we conceive to be consistent with the circumstances of the disease, and the present state of our knowledge regarding it. We characterize it then as a morbid condition of the body, evinced by the development of an elastic uneven tumour, or tumours, not painful in their early stage, and

becoming so only by implication with surrounding parts; tending to ulceration, and by ulceration presenting to view a soft and spongy fungus, rapid in its growth, readily bleeding in vascular textures, and emitting a peculiar serous discharge of a very fetid odour, more or less coloured with blood.

A blow or injury of some kind is very often the immediate forerunner of this species of tumour, and the latter generally leads to the first manifestation of the disease; but in many instances its origin cannot be traced to any particular exciting cause. It is found to occur much more frequently in the young than in persons advanced in life; children from the earliest age being often its victims. The persons whom it has most generally attacked have been those of a sallow complexion, a lax and flabby texture of the skin, and a weak circulation. Observations are wanting to enable us to decide whether it is more prone to manifest itself in one sex than in the other, although the last mentioned observations, with the recorded experience of this and cancerous diseases, are favourable to the supposition that females are more frequently the subjects of it than males. Climate, it is probable, has some influence on its production; for we are told by Sir Everard Home, in his Dissertation on Tumours, that in the island of Otaheite, and those of its neighbourhood, where fighting is the common mode of deciding quarrels amongst the women, the blows are principally aimed at the breast, which has no defence, and that cancer has never been met with in these countries. We have good authority, too, for stating that it very rarely arises in India; and these remarks, for obvious reasons, we conceive to be equally applicable to the form of disease which is the subject of this article. That the constitution favourable to the development of fungus hæmatodes is transmitted hereditarily we cannot doubt; and that all circumstances which are of a debilitating nature have a secret influence in preparing the way for its production, we conceive may reasonably be assumed from the accumulated experience and observation of past ages on the predisposing causes of cancer. In a large majority of instances, fungus hæmatodes has terminated fatally: indeed, the recorded exceptions are so rare, and pathologists of the highest repute so agree in opinion as to its general fatality, that it may almost be questioned whether the instances which are related of its favourable issue are not to be referred to some distinctive peculiarity in the morbid change, unrecognizable in the present state of science, rather than to any favourable state of constitution or difference of treatment. The period to which life has been limited after the development of this terrible disease has rarely exceeded two years, whether its removal has been attempted by extirpation of the tumour, or every other expedient adopted consistent with the circumstances of the case and the resources of science. It generally proves fatal in a much shorter space of time, and death too often seems to have been expedited by the removal of the local disease, even

to the extent of extirpation of the part, or amputation of the limb on which it may have been situated. In those cases in which the eye has been extirpated, unless a return of the disease has produced death, the growth of a similar tumour in the brain has usually been the immediate occasion of it; and when a limb, or the mamma has been removed, or even the testis, a corresponding formation in the lungs has immediately followed, and, increasing with rapid strides, has put a fatal period to the sufferings of the individual; whilst at the same time the liver most commonly, and generally several other organs and structures of the body, have been studded with similar formations.

The physical circumstances leading to the formation of these tumours are connected with a most important subject of pathological science, viz. the local and constitutional origin of disease. After premising that pathologists of the highest repute in this country have assigned to fungus hæmatodes a local origin, it is with the utmost deference we venture to assert that proofs are wanting to establish this fact, and that we consider it infinitely more consistent with acknowledged physiological principles, and the changes which we know to be produced in the elementary components of the body in this as well as in some other diseases, to assume that a morbid condition of the blood is a link in the chain of causes of fungus hæmatodes, prior to its local manifestation. We should scarcely have hazarded this opinion had we not met with sanction in the observations of Bichat and Andral; and but for the fact, admitted by those who have contended for its local origin, that the secondary formation is consequent to that change in the constitution which appears to us to be productive of the original tumour.

No one will doubt that the blood, like the other constituents of the body, is frequently altered in its nature by disease; and as it is secondary only to the chyle in the sequence of bodily formations, and is the acknowledged element of all secretions healthy and morbid, the question, we conceive, resolves itself into either the presence of the morbid matter being already in the blood, or a specific adaptation of the secreting organ to its formation. For proof of the latter we have searched in vain; but with regard to the former, we know that the qualities of the blood when this disease exists are changed; that it is much thinner than healthy blood; difficultly, if at all, coagulable; and almost wholly unequal to the process of adhesive inflammation; in fact materially deficient in the important constituent, fibrin. Andral has discovered in the blood not only different elements of secreted fluids, but, as well as other morbid productions, the peculiar one which belongs to this disease so combined with it as to alter its physical properties; occasionally limited to particular vessels, but sometimes in the greatest part of the circulatory system, when at the same time a corresponding morbid production was seen to pervade the texture of many of the solids. Similar facts, he observes, have been mentioned by Béclard and Velpeau;

the former having referred to a case in which the heart and the principal trunks of the vessels were filled with a solid clot, the interior of which presented numerous collections of encephaloid matter; and the latter to a similar formation in the vena cava. He also cites the case of a man who died almost suddenly, after having shewn some symptoms of cerebral congestion, and in whom, upon examination, there was found through the whole extent of the circulatory system a blood of a pultaceous consistence and blackish red colour, resembling the matter of certain abscesses of the liver. For further information on this part of our subject we refer to the interesting observations of Andral on the lesions of the blood; but we must acknowledge that there are still wanting many facts to remove all the objections which may be opposed to our views.

It is universally admitted that fungus hæmatodes is in most instances a constitutional disease before it comes under medical cognizance, and its origin is usually referred to a "peculiarity of constitution;" an observation which to us seems almost to involve the question at issue. That the local effect is, as in the case of other tumours, a morbid secretion, is undoubted. From its consistency it readily insinuates itself in the interstitial cellular substance, separating the vasa vasorum from their natural attachments, and by constantly exposing the external parietes to the action of a semifluid, they may besaid to undergo a kind of maceration, and hence so to degenerate as to become unequal to the retention of their contents, or readily lacerable by the slightest local injury. Thus we consider the hemorrhagic tendency to be secondary, and superadded to the secretion itself; an opinion which we conceive to be verified by the appearance of the tumour, as seen in a state of ulceration in the mamma or extremities; as modified when it occurs in the glandular structure of the testicle; or as inspected when separated from the body and carefully washed with water.

The substance of the tumour, which from its resemblance to the brain has been called cerebriiform and encephaloid, presents itself, according to the observations of Laennec,* under three different forms: 1. encysted; 2. irregularly compacted without cysts; 3. infiltrated in the tissue of an organ. In whichever of these states it exists, its progress may be divided, says this eminent pathologist, into three stages; that of its formation, or the stage of crudity; that of its entire development, when it most resembles the brain; and that of its *ramollissement* or softening. It has been remarked, however, by Andral, that we have no proof that the encephaloid matter in the state of softening can only occur subsequently to the other stages; and we are disposed to believe with him that this is in many instances the state of its primary formation,—the state certainly in which it is first recognized as characteristic of the specific disease.

In its earliest stage the cerebriiform tumour is lobular, moderately consistent, and appears composed of minutelobules closely compacted, marked by lines running parallel but not cooping with each other. Its colour is a dull or yellowish white. The cyst is probably secondary in formation to the enclosed substance, as traces of cyst are often found in one part and the tumour exposed in another. When completely developed, it is homogeneous, in colour milky white, occasionally tinged with red, and in consistence resembling the brain; it is greasy to the touch, and when divided soils the knife; when cut into small slices, it is semi-transparent; like brain also, when exposed to the atmosphere, it softens; and when the softer parts of the tumour are washed away, or when the mass is compressed, a loose filamentous texture, resembling cellular membrane, remains. In the mass, however, as separated from the body, a number of bloodvessels are usually to be observed pervading the whole texture. Their parietes are thin and easily ruptured; and extravasated clots of blood are here and there interspersed, giving the whole, says Laennec, an appearance resembling the lesions observable in dissections of sanguineous apoplexy.

The cerebriiform matter does not remain long in the state described, but proceeds rapidly to that of *ramollissement*, and, thus rendered more miscible with the extravasated blood, its colour is influenced accordingly, and is varied from a reddish white to a dark sanguineous hue. This state of softening is found to occur at different periods in the same tumour; some parts being much firmer than custard, and others harder than the most solid parts of the healthy brain. This medullary matter is very sparingly soluble in water: if exposed to the flame of a candle in a silver spoon, it assumes the colour of opal, and it leaves after evaporation an inappreciable residue. With the addition of spirits of wine the watery solution threads slightly, without coagulating by the action of heat; this mixture evaporated, like the preceding, leaves some small grey clots. Exposed to the direct action of heat, it becomes brown, but does not liquify like grease; and it has a smell of roasted meat. If immersed in spirits of wine, it does not undergo any apparent change. In a saturated solution of corrosive sublimate it coagulates so as to form white filament, the solution remaining transparent. Acetic acid has no visible effect upon it. Slowly boiled in water the liquid remains clear, without grease; and does not jelly when it becomes cold.*

The medullary structure, though often found alone, frequently co-exists with other varieties of diseased production; as fibrous or scirrhous masses, pus, scrofulous matter, melanosis, hydatids,† and in some cases ossific or earthy particles have been found intermingled with the pulpy matter. In many hæmatoid tumours there are distinctly insulated portions much resembling boiled yolk of egg; and so often

* Diction. des Sciences Médicales, Art. *Encephaloides*.

* See Mémoires sur la Fongus Médullaire, par J. P. Maunoir.

† See Andral, vol. 1. p. 219.

has this peculiar substance been found in those organs wherein fungus hæmatodes has been detected, that the circumstance might almost be considered a characteristic of the disease.

We have stated that the earliest notice we have of fungus hæmatodes as a distinct disease has been transmitted to us by Mr. Burns, under the name of spongoid inflammation. The cases related by him, five in number, were confined to its occurrence in the extremities. Of the ten cases next published by Mr. Hey, it manifested itself in five in the extremities, in three in the female breast, in one in the lower jaw, and in another at the back of the neck. Mr. Abernethy, in his *Surgical Observations* published in 1804, related a case of diseased testicle, to which he gave the name of medullary sarcoma, since used by him and by many surgeons synonymously with fungus hæmatodes as it occurs in this as well as in other parts of the body, and the identity of which with the pulpy testicle described by Dr. Baillie is now universally admitted. In the best treatise we possess on this subject, published by Mr. Wardrop in 1809, and to which we are largely indebted, are collected all the scattered accounts which our literature affords relating to fungus hæmatodes prior to that period; and there we find related cases with dissections of it as it occurs in the eye, the uterus, the ovaria, the liver, the pancreas, the spleen, and the lungs. Hæmatoid tumours have since been met with, as the same writer remarks,* in the urinary bladder and alimentary canal, in the brain, in the bones, in the mesentery, in the omentum, and in the thyroid gland. Laennec states that he has seen two cases of encephaloid growth in the heart: in one the morbid matter formed several small masses in the muscular substance of the ventricles; in the other it was deposited in layers from one to four lines thick along the coronary vessels. M. Olivier, in his work on the spinal marrow, relates another case of encephaloid tumours deposited in the substance of the same organ. M. Velpeau has published a remarkable case of the same kind, in which similar tumours were also found in the lungs, between the pleura and ribs, in the bronchial glands, under the mucous membrane of the stomach, in the duodenum, in the pancreas, in the right kidney, in the liver to the amount of several hundreds, between the tunics of the gall-bladder, in the different parts of the peritoneum, in the thyroid gland under the skin, and in the muscles of the right thigh. We ourselves remember to have witnessed a case in St. George's Hospital, which proved fatal, and on a post-mortem examination exhibited the existence of the same kind of tumours, in very considerable numbers, in all the organs of the several cavities of the body, and dispersed under the integuments of the trunk, as well as of the superior and inferior extremities. The absorbent glands, though in most instances contaminated in the early or in

the advanced stages of the primary tumour, as far as we know, have never been the original seat of the disease. In some cases they grow to an enormous size, whilst in others they are but slightly enlarged. In some the primary affection makes little progress, whilst the disease of the glands advances rapidly and seems to be the immediate cause of death. Their structure is generally converted into a substance resembling the primary tumour, exhibiting a homogeneous pulpy mass contained in one firm cellular capsule; in this respect differing from the primary tumour, which is usually lobulated and intersected by cellular strata. In some cases the skin covering the gland ulcerates, and forms a foul sloughy ulcer, but rarely, if ever, produces a fungus.*

The indiscriminate manner in which cancer and fungus hæmatodes have been usually regarded, renders it necessary that their diagnostic symptoms should be particularly attended to; we shall now proceed to an exposition of these in their general character, reserving for after consideration their local peculiarities.

The fungoid tumour before ulceration is soft and elastic, giving in most cases a more or less obscure sense of fluctuation. It does not always occasion pain; and when it does, it is of a throbbing, and not lancinating kind. It exists very rarely beyond two years without going through all its stages, and occurs most frequently in persons who have not reached the middle period of life; very often in childhood and from the earliest infancy.

Immediately after ulceration has taken place a soft spongy fungus appears, and grows rapidly; emitting a discharge like serum, which immediately mixes with the blood, always to a certain extent at the same time extravasated. The appearances of the fungus hæmatodes when taken from the body having been already discussed, we need only suggest a comparison between its properties and those of a cancerous tumour. The cancerous, or, as commonly called, scirrhus tumour is hard, firm, and incompressible, and in its formation and progress is always attended with lancinating pains; the integuments above the tumour are usually corrugated, and exhibit on their surface several short white lines, which are in reality so many germs of the disease. In many instances scirrhus is slow in going on to ulceration; it often continues for many years, or until the termination of life, without it. It occurs generally in persons advanced beyond the middle period of life, and is scarcely ever known to take place before the age of twenty-five. In its ulcerated state its hard firm substance is transformed into a thin ichor; and, generally, the tumour does not increase in bulk, but is destroyed by the process; or if a fungus succeeds, it is hard and firm in its texture. The scirrhus tumour, when separated from the body, is hard, firm, and incompressible, and is composed of two substances, one indurated and fibrous, the other soft and inorganic. The

* Preface to Baillie's *Morbid Anatomy*, edited by J. Wardrop, Esq.

* See Mr. Wardrop's *Essay*.

fibrous matter is the most abundant, consisting of septa, which are paler than the soft substance between them. The latter is semi-transparent, of a bluish colour, resembling in consistence softened glue, but occasionally more opaque, softer, and somewhat oleaginous. The fibrous matter is more or less condensed and radiated, the interstices being filled with the softer substance; and sometimes the whole tumour, or parts of it, are converted into a substance resembling cartilage, which is occasionally the nidus of bony depositions.

Scrofulous tumours bear a much nearer resemblance to those of fungus hæmatodes previous to ulceration than the preceding. Their locality is often the same, though the lymphatic glands are most frequently the seat of the primary tumour in scrofula,—an occurrence which is rarely, if ever, found in fungus hæmatodes. As the tumour of the former approaches to ulceration, the integuments assume a red, but never the livid colour of the latter, and when pressed are considerably less elastic; they are frequently also found in clusters, which never is the case in fungus hæmatodes. The sallow, almost greenish cast, in the complexion of the sufferer from fungus hæmatodes, and the smooth and fair skin of the scrofulous individual, will materially assist in determining the two diseases. After ulceration has taken place, all difficulty is at end; the bloody fungus, and peculiar fetid discharge of the one, compared with the flaky pus-like matter of the other, with the whole character of the ulcers, and their progress, render it unnecessary to dwell on the distinctive peculiarities of the two diseases. When the brain, or viscera of the cavities belonging to the trunk of the body, become the primary seats of the fungus hæmatodes tumour, the indications of its existence are necessarily very obscure. In its early stage, either when external or internal, the tumour is often wholly unirritant; and the presence of formidable disease is suspected only from the unhealthy aspect of the countenance, produced by the peculiar sallow complexion of the skin. The tumour, as it increases, will of course produce all the mechanical effects of a foreign body, in whatever part it may be situated; and the influence of disease will be more and more manifested throughout the system. Increasing debility, and at length hectic fever, are the prominent constitutional effects which we are called upon to combat; but experience shews that we have yet to learn the means of staying, even for a little time, their rapid progress to a fatal termination.

When there is already evidence of the existence of fungus hæmatodes by its appearance in an external part, and symptoms of disease in an internal organ arise, we cannot fail in deciding its nature. Of those organs which have no outlet, the liver is the only one in which we can by external examination ascertain its presence. Dr. Baillie, however, states that he has only known it as a secondary formation in this organ, and Mr. Wardrop's observations are to the same effect; but the

latter writer suggests that the soft brown tubercles of the liver, described by Dr. Baillie, are probably of this nature, though they are merely noticed as a very rare appearance of disease, without any remark as to their identity. In Dr. Farre's work on the morbid anatomy of the liver, we find described a disease of this organ named by him *tubera diffusa*, the character of which bears so close a resemblance to that of fungus hæmatodes in other parts, that with due allowance for the modifying influence of the organ itself, we are inclined to consider it as the same. In this as in other organs, it has usually proved irremediable, and admits only of a palliative plan of treatment: every attempt to cure or suspend its progress by the specific action of mercury has proved worse than useless, an observation applicable to the treatment of fungus hæmatodes wherever may be its locality; for it tends only to expedite the exhaustion of those powers which are rapidly failing in defiance of all the means which art can yet summon to their support.

To complete the view of fungus hæmatodes, considered as a disease generally, we ought now to give an account of it as it affects the various internal and external parts of the body, and more particularly those in which it exhibits characteristic appearances, as the uterus and its appendages, the eye, mamma, testis, and extremities; but as nearly all these are within the domain of surgery, and come not therefore into the plan of the present work, we must here terminate what we had to say of the pathology of the disease.

Treatment.—Having had frequent occasion throughout the present article to advert to the untractable nature of the local and constitutional symptoms of the disease which is its subject, it might, on a superficial view, appear superfluous to make any further observations on its treatment. Those, however, who are in search of information to be adapted to circumstances, will be the more anxious for it in proportion to their difficulty, and it is as important in practical medicine not to make attempts inconsistent with reason and experience in incurable cases of disease, as to use the requisite means in those which are curable. It is of the utmost importance also, in our views of improvement, to know what has been done, in order that we may learn what more we can do,—or, as Andral has emphatically expressed himself on a subject yet in obscurity, and not irrelevant to the present, to keep an inventory of the facts we are in possession of, and to determine accurately where we are, in order that we may know where we are going.

It is to be kept in mind that fungus hæmatodes is a disease which, from the earliest period that it comes under professional attendance, evinces manifestations of increasing and hitherto irresistible debility; and that, as a morbid poison, which it is in the strictest sense of the term, its action is progressively destructive of that organic irritability which belongs to a healthy condition of the solids.

These, it must be confessed, are rather negative than positive indications to our treatment; but, for the reason suggested, they are not the less essential. Whether we regard the local or constitutional symptoms, reason as well as experience have determined that the class of remedies which constitute the antiphlogistic system is to be excluded from our plan of treatment. Locally considered, frictions, plasters, leeching, blistering, or handling this species of tumour, have been found rather to accelerate than to retard its progress. From its contiguity to particular structures it occasionally excites an irritative heat, which the simple application of tepid water, or at most an evaporating lotion, consisting of one ounce of spirits of wine with five ounces of common distilled or rose water, is calculated to remove. The use of a lancet, or other incision, with a view of evacuating its contents, under the mistaken idea of the tumour being in reality an abscess, (a mistake which has unfortunately frequently occurred,) has always tended to accelerate the progress of the disease, and is calculated to bring great opprobrium upon the operator. When ulceration takes place and the fungus appears, it is important to know that the direct application of greasy or unctuous substances seems to increase, and only when combined with an escharotic, to retard the vegetative tendency. A painful or irritable state of the fungus has occasionally been relieved by an application of three drachms of the subnitrate of bismuth, mixed with one ounce of spermacetic ointment; and in such a condition fomentations with a decoction of the heads of papaver somniferum, or the fresh leaves of the conium maculatum, may be resorted to with advantage. But for the most part we have to contend with a fungous growth which is insensible, and seems to indicate the use of direct stimulants; the strongest escharotics have therefore been applied, and in some instances without checking even its increase. Mr. Hey informs us that neither the hydrargyrus nitratu ruber, the hydrargyrus muriatus, the antimonium muriatum, nor the undiluted sulphuric acid, have been sufficient for this purpose; but as we frequently find that the upper and exterior part of the fungus is separated and falls away, by the exuberance apparently of its vegetative principle, we cannot reasonably expect much advantage from such applications, or ought to do so only in the ratio of our approximation to the base of the tumour. Our belief is, that this is placed beyond the reach of surgery, and, failing in our attempt, that such means have the effect of accelerating the fatal issue of the disease.

We have seen apparently some temporary advantage, in two instances of this affection in the female breast, from the direct application to the ulcerated surface of a paste made of carbonate of iron, with a sufficient quantity of honey to give it a soft consistence; but neither in this nor in any other commonly used applications have we any promise of a positive remedy. Whether the application of a solution of the chloride of lime may be advan-

tageous, our experience in this affection does not enable us to determine; but from our knowledge of the relief and comfort it has produced as an injection in cancerous affections of the uterus, and as a lotion to foul ulcers, we cannot refrain, in the dearth of our resources, from suggesting its use. We anticipate no more from it than the advantage to which we are at present limited, of promoting the comfort of the sufferer; and, in his catalogue of miseries, the horrible fetor of the fungus, which it is calculated to remove, is certainly not the least distressing.

We have already sufficiently expressed ourselves on the question of excision and amputation; it remains for us only, therefore, to consider the constitutional treatment. We have searched in vain for authority to assist us in this part of our subject, and cannot but feel daunted in offering our own suggestions when one of the most experienced surgeons of the present day* has thus expressed himself: "We may sometimes prevent the disposition to the formation of this disease by giving alterative medicines; but no medicine with which we are acquainted has any power over it when it is once formed." So far as it is connected with the even less fatal disease, cancer, which, though mostly incurable, has its hundred remedies, we may fairly take the sanction of the remark, "*tædet et pudet garrire de remediis specificis.*" We have still, in the exercise of our profession, to do the best that circumstances may allow; and it is to be remembered that we are as much the guide, and our duty is as important in the difficult and dangerous path, as in that which is plain and easy. The indications we possess would lead us to advise the use of a diet nutritious, calculated to increase the fibrinous quality of the blood, and at the same time easy of digestion; the powers of the stomach being alike enfeebled with those of the other organs of the body. We should also recommend free communication with the external air, and gentle exercise, as long as they can conveniently be borne; the occasional use of medicine calculated to keep up the natural action of the alvine canal without exhausting the bodily powers, and such tonics as we have found in this and diseases most nearly allied to it to preserve the patient longest, and with least tendency to disturbance of the alimentary functions. Amongst these we would especially specify sarsaparilla, quinine, and minute doses of the muriated tincture, or other mild preparations of iron. Rest and ease from pain must be procured by suitable narcotics, and even when the fatal hectic arrives, we have yet our duty to perform. It is that which is emphatically enjoined in the humane and affecting language of the illustrious Gregory, applicable to every part of our melancholy task in this disease: "*Et profecto in omnibus morbis quum jam ad extrema ventum est, et instantis mortis indicia spem nullam sanationis relinquunt, aliquid adhuc solerti medico faciendum superest: erit enim quoddam in tali*

* Sir Astley Cooper, see lectures.

miserrimo et desperato statu, lenire mala quæ summovere nequeat, et *εὐθανάσιον* saltem moribundo moliri, siquidem vitam ejus neque conservare possit, neque amplius producere.”

(*W. Kerr.*)

GALL-STONE.—See JAUNDICE.

GALVANISM. In 1797, Lewis Galvani, professor of anatomy in the university of Bologna, laid, by an accidental observation, the foundation of by much the most interesting and important branch of electrical science. Having suspended some frogs, which he had procured for physiological purposes, by copper hooks to the palisades of his garden, he remarked with surprise, that whenever by the impetus of the wind they were brought in contact with the iron bars of which the palisades were composed, their muscular systems were strongly convulsed. The fame of this extraordinary experiment rapidly spread throughout the entire of Europe. It was repeated and varied in an infinite number of ways, in the cabinet of the philosopher and the theatre of the mountebank, and never failed to excite the curiosity of the learned and the astonishment of the vulgar.* Galvani was fortunate in the time of announcing his discovery. It was an era of mighty changes and of great reforms. In the very capital of continental science, the human mind, just freed from the fetters which long had bound it, became the slave of prejudices by no means unnatural. What was old was rejected, frequently because of its antiquity alone; while every novelty came recommended by irresistible attractions. There was also another and a very different cause to which may, at least in part, be attributed the interest excited by the observation of the Italian philosopher. To many it appeared that a clew was now at length afforded for ascending to the long-sought-for source from which spring the mysterious phenomena of life and organization; and that, in particular, by prosecuting the rout thus pointed out, the nature and cause of nervous energy could not fail of being unfolded.

Galvani was not slow in framing an hypothesis to account for the phenomenon which he had been the first to observe. According to him, a peculiar fluid existed in the nerves of the animal in a state of accumulation, which, rushing through the interposed metals, was precipitated upon the muscles, and produced their spasmodic action. Upon this theory the animal body is but a sort of charged Leyden jar; the nerves representing its internal, and the muscles its external coating; the discharge also being effected in the ordinary manner,

* This experiment is best performed by removing the upper part of the trunk of the animal, drawing off the skin from the inferior portion of the trunk and lower extremities, and cutting away the bones of the pelvis and contiguous soft parts; so that the lumbar vertebræ may remain connected to the thighs by the crural nerves alone. A copper hook is now to be attached to the vertebræ, or made to embrace the nerves, and then hung on a rectangle composed of iron wire, which, by being inclined, is made to come into contact with the pendient limbs.

namely, by establishing a connexion between the oppositely affected surfaces. This analogy was suggested at a very early period, and was for a length of time considered as conferring a high degree of probability on the views from which it originated.

Though this explanation was very generally acceded to, philosophers were by no means agreed respecting the nature of the fluid whose agency it employed. By some it was denominated nervous fluid, under the idea, no doubt, that it was identical with that power on which the functions of the nervous system depend; and this is the opinion which would seem to have been entertained by Galvani himself. His followers, however, usually spoke of the *galvanic* fluid in honour of their master, and to commemorate his discovery.

A different, and, as we shall see, a more correct opinion soon began to prevail. It was very early observed that the same substances which are conductors or non-conductors of the electric, are also conductors and non-conductors of the galvanic fluid. Hence it was by many inferred that the two were identical; a conclusion, however, firmly resisted by the adherents of Galvani, who still continued to view in his experiment the operation of a vital force.

It was at this period that Volta, professor of physics in the university of Pavia, after a diligent study of the phenomenon which at the time engrossed so much of the attention of the scientific world, was led to the discovery of a condition essential to its occurrence, which had escaped all of his predecessors. If the nerves and muscles be connected by a single metal, there are no convulsions; but if by an arc composed of two dissimilar metals, convulsive motions always ensue. Having established this important point, it still remained for him to account for the agency of the two metals, or to explain the precise manner in which they determined the production of the spasms. This he accomplished in the most satisfactory manner, by shewing experimentally that dissimilar metals upon contact assume opposite electrical states; or that the one becomes vitreously, the other resinously charged. Having effected this, the true theory of Galvani's experiment was sufficiently obvious. By the contact of the copper hook with the iron palisades, the latter became vitreously, and the former resinously electric. But when the limbs of the frog touched the iron bars, the free fluids rushed together by the rout thus opened to them, and combining in the body of the animal, produced the spasmodic contractions of its muscular system. Such was the explanation given by Volta.

These views, which appeared but a legitimate deduction from facts, though generally received elsewhere, were not admitted by Galvani. He denied the necessity of a second metal, and quoted indisputable cases of convulsions excited by a single arc, as a refutation of the entire theory.

That contractions are occasionally produced by a single metal, Volta did not deny. More

extended researches, however, upon the electricity developed by contact, enabled him to reconcile such cases with his own views. He found, in fact, that the metals were not the only forms of matter which, when made to touch, acquired the opposite electricities; but that this property belonged to any two heterogeneous substances. Thus, if a disc of wood be made to touch one of marble, an electric decomposition ensues; and the only difference between this case and that of two dissimilar metals is, that the electricities developed possess a much lower intensity. Now, adopting these conclusions, it is easy to solve the objection of Galvani. The metal employed by him may have possibly included a minute quantity of some other metal in the form of alloy; or such may have adhered mechanically to it. Or, should neither of these suppositions be correct, it must at all events, when interposed between the nerves and muscles, have touched, at each extremity, substances of a very different nature from its own; a circumstance which, according to the researches of Volta, was quite sufficient to account for the development of electricity. The facts, therefore, relied upon by Galvani were not only not inconsistent with, but directly deducible from the principles of Volta. It may also be observed, that by means of a single metal we but rarely succeed in producing contractions; and that, when they occur, they are extremely feeble.

When two dissimilar metals are made to touch, the one becomes positive, and the other negative. This was the capital discovery of Volta. The power which produces, in such cases, the electric decompositions, he denominated *electromotive force*, and the substances employed, *electromotors*. All metals, however, it should be recollected, are not equally good electromotors. Thus zinc forms a more efficacious combination with silver than with copper; and a still more powerful one with platina than with silver. As a general rule it may be laid down, that the more two metals differ as to their affinities for oxygen, the more energetically will they act as motors of electricity; to which may be added, that the more oxidable metal invariably acquires the vitreous or positive, and the less oxidable metal the resinous or negative fluid. Such are the uniform results of experiment.

The tension of the fluids liberated by the contact of a single pair of metals, when examined by the most delicate condenser, proves to be extremely feeble; and it even requires considerable address to demonstrate, with this instrument, the development of any electricity at all; though, by means of the frog, the most sensible of all electrosopes, it may, as we have seen, be strikingly displayed. In reflecting, however, upon his fundamental discovery of the development of electricity by heterogeneous contact, it occurred to Volta that by properly connecting several *couples*, their separate powers might be so combined as to evolve the elementary electric fluids in a high state of tension; and, upon submitting this conception to the test of experiment, he had the satis-

faction of finding it fully verified. The following was his method of proceeding. A disc of silver being placed upon a table, one of zinc was laid upon it; and upon this a bit of thin pasteboard soaked with a solution of common salt. Another silver disc was put upon the pasteboard; upon it a disc of zinc, and upon this again a second bit of pasteboard, and so on; similar discs of silver, zinc, and pasteboard being constantly piled upon the preceding, and in the order which has been described. Having superimposed in this manner thirty or forty couples with their intervening pasteboards, upon applying a finger of each hand to the extremities of the column, he received a pretty smart shock, and upon connecting them by copper wires he observed the production of a slight spark. Such was the origin of the celebrated pile of Volta.

The instrument just described is usually known under the name of the *columnar pile*. Several modifications of it have from time to time been invented. But it will be sufficient, with a view to the present article, to confine ourselves to a description of the *voltaic trough*, this being the form of galvanic machine most generally employed, particularly for medical and physiological purposes. It originated with Mr. Cruikshank, and may be constructed as follows. A number of equal plates of zinc and copper, of a square or rectangular shape, are procured; and each plate of zinc being soldered by one of its faces to a plate of copper, the compound plates are then cemented into a rectangular cistern of wood, at distances from each other of about half an inch, care being taken that the contiguous couples shall always present to each other dissimilar faces—zinc, for example, to copper. The cistern, whose breadth is the same with that of each couple, is thus divided into cells; and when the machine is to be rendered active, these are to be filled to within a short distance of the top with an acid solution. On the contrary, when the trough is not in use, it is to be emptied of its acid, and well washed with water to prevent any unnecessary corrosion of the metals. This machine does evidently not differ, in any essential particular, from the original invention of Volta. They are both composed of dissimilar metallic electromotors, similarly arranged in reference to each other, the only differences being, that in the pile they have a vertical, in the trough a horizontal position, and that in the former the couples are separated by a disc of cloth or pasteboard moistened with an acid, while in the latter they are separated by strata of the acid solution itself.

We may now proceed to an examination of the phenomena exhibited by the voltaic apparatus, and of the singular powers which it is capable of exerting. These may be conveniently studied under the four following circumstances:—1. when the circuit is incomplete, that is, when the opposite extremities of the pile are not connected by a conductor of electricity: 2. when the interposed medium is an imperfect conductor, such as water, the acid, alkaline, and saline solutions: 3. when

it is a good conductor, as charcoal or the metals: 4. when the circuit is completed through a living animal. Upon the three first heads, which comprehend the science of galvanism, as it is related to chemistry and general physics, our observations shall be very brief; but upon the fourth we shall dwell with more minuteness, as it includes topics the discussion of which must prove interesting to the physician and the physiologist.

If the upper end of a columnar pile, whose lower end is in connection with the ground, be examined by appropriate means, it will be found to be electrically excited. The pile being supposed to consist of zinc and copper discs, when the former is uppermost the electricity is positive, and negative when the latter crowns the column. The tension also of the electricity is directly proportional to the number of couples; so that in three piles consisting of twenty, forty, and sixty couples respectively, the tensions are as the numbers one, two, three. The lower extremity of the pile, or that which communicates with the ground, manifests, of course, no symptoms of excitement. If the pile be insulated, by building it upon a plate of glass or resin, or suspending it in a dry atmosphere by a silken cord, both extremities will be found charged; the zinc end with positive, and the copper end with negative electricity, while its central point maintains the neutral state. In receding from the centre also on either side, the electric tension, which is at first feeble, goes on augmenting until it attains its maximum at both ends, which are from thence denominated the poles of the pile, from their analogy to the extremities of a bar magnet. It is almost unnecessary to observe that these statements are equally true of the trough, or any other form of voltaic machine. Upon the principles of Volta, also, which we have all along adopted, it would be easy to assign the theory of the accumulation of the elementary electricities at the opposite poles. But from this discussion we purposely abstain, as being one which is destitute of any immediate practical bearing.

Before observing upon the effects produced by the voltaic machine when its poles are connected by conductors, it will be proper to form clear notions upon what is usually denominated the *direction* of the electric current. Upon the theory of Dufay, (see *ELECTRICITY*;) it is obvious that the two kinds of electricity are set in motion at the same instant, and that a current of positive electricity in one direction bespeaks a current of negative electricity in the opposite direction. It is sufficient, however, to confine our attention to one of the elementary fluids, the direction of one determining the course of both; and that pitched upon by common consent is the positive. Whenever, therefore, mention is made of the direction of the electric current, it must be understood that we speak of the positive or vitreous electricity. Thus in the pile itself the electric fluid is said to move from the copper to the zinc end; while through the conducting medium supposed to connect the poles, its rout is alleged to be from

the zinc to the copper. This statement is strictly true of the positive or vitreous fluid, and we limit ourselves to the description of its course alone for the sake of brevity.

In all machines consisting of more than one pair of electromotors the direction of the current is obviously what has been just described; that is, it sets, in the pile itself, from the copper to the zinc end, and, in the arc which completes the circuit, from the zinc to the copper. But in an elementary pile, or one including but a single pair of metals separated by an acid or saline solution, the direction of the current through a wire supposed to connect the plates is from the copper to the zinc, or apparently in an opposite direction to that just described. This, however, is really not the case, as will be obvious upon reflecting that the connecting wire is a part of the copper element of the combination, while the fluid is merely the conductor interposed between the poles. Though, in fact, in this simplest form of voltaic combination the current moves from the copper to the zinc through the wire, and from the zinc to the copper through the fluid, its direction is the same as in a pile of several couples; for the wire is a part of the pile itself, and the fluid the medium which completes the circuit.

When the circuit is completed through imperfect conductors of a compound nature, they undergo decomposition, some of the elements appearing at the positive, others at the negative pole. This fact was first noticed by Carlisle and Nicholson in the case of water, and the researches of other chemists, particularly those of Berzelius and Davy, have shewn that it holds in every variety of compound substance when subjected to the action of a battery of sufficient power.

When the wires usually attached to the poles of a battery for completing the circuit are armed with cones of charcoal, and then approached to each other, heat and light of the most intense description are immediately developed, and the phenomena are equally brilliant in vacuo as in atmospherical air. If the circuit be completed through a fine wire, it immediately undergoes vivid ignition, and finally melts, even though it be composed of platina. And if for wire the different metallic foils be substituted, they burn with scintillations of the most brilliant description.

In more modern times other very singular phenomena have been observed upon passing a galvanic current through a wire, or other conductor, placed in the vicinity of a magnetic needle. When the wire is parallel to and immediately over the needle, a current, whose direction is from south to north, causes a deviation to the left hand, or the west. If the wire, its parallelism to the needle being always preserved, be placed just under it, a deviation eastward, or to the right hand, is produced. If the dipping-needle be now substituted for the compass, and the conducting wire be placed to its west, a depression of the north pole immediately ensues; if to the east, the same extremity is elevated.

These constitute the great discoveries of Ersted, which have given rise to the science of electro-magnetism, and promise, at no distant period, to rectify and generalise, to an extent which could not be previously anticipated, our notions respecting some of the most important of the powers of nature. This brief notice of them is introduced here chiefly for the purpose of rendering intelligible the nature of the galvanometer, an instrument which we shall have occasion hereafter to refer to, and of which it is a sufficient description to say, that it indicates the force of electrical currents by the deviations which they produce in a horizontal magnetic needle, around and in the vicinity of which they are made to circulate through a wire situate in a vertical plane passing through its two poles.

Having glanced thus rapidly at the origin of the science of galvanism, the discoveries of Volta, and the application of his machine as an agent of analysis, and for the production of calorific and electro-magnetic effects, we may now proceed to the more immediate object of this article, namely, the examination of the influence of the pile upon the living system, and the exposition of its therapeutic agencies. The two latter subjects are obviously intimately connected, and should, therefore, be studied in conjunction.

The galvanic current, when brought to act upon the living body, is capable of producing three orders of effects. 1. It produces peculiar sensations. 2. It determines muscular contractions. 3. It is supposed to influence the organs of secretion. Upon these we shall observe in succession.

If a slip of zinc, applied to the tip of the tongue, and a dollar, placed between the gum and upper lip, be brought into contact, a decidedly acid taste is experienced; but if the position of the metals be reversed, the taste will be a decidedly alkaline one. In order to the production of these sensations the tongue must be covered with some moisture, for, when perfectly dry, no such impressions are perceived. Hence it is probable that such sensations are owing, not to any direct action of galvanism upon the tongue, but to the decomposition of the salts of the saliva, and to the consequent development of an acid and an alkali at the opposite poles. Berzelius first noticed similar effects from streams of common electricity directed by a painted wire upon the tongue, or that the vitreous fluid produced an acid, and the resinous fluid an alkaline taste.

When the experiment, just described, with the slips of zinc and silver is performed in the dark, a flash of light is perceived, which is observable not only upon bringing the metals into contact, but also upon separating them from each other; and it is worthy of remark that the flash is most vivid when the zinc or positive metal is in contact with the tongue. A more decided effect may be produced by attaching to the eye-ball, beneath the eye-lid, a slip of tin foil, placing a silver spoon in the mouth, and connecting it and the foil by any

metallic ore. The experiment succeeds also in the light, and whether the eye be open or shut; and at the instant of the contact of the metals the pupil is observed to diminish in size, just as when the eye from comparative darkness is suddenly exposed to the glare of sunshine. The luminous couruscations observable in these experiments are probably the result of the mechanical action of the galvanic fluid upon the retina, for phenomena of precisely the same description may, as is well known, be produced by inflicting a slight blow upon the eye-ball.

Upon the pain produced by galvanism it is unnecessary to dwell. It is an invariable accompaniment of the sudden transmission through, or withdrawal from the body, of a strong electric current. During the completion of the circuit also, a disagreeable sensation is experienced, which becomes extremely distressing if the part of the body at which the current enters, or from which it issues, be deprived of its cuticle, or if there be a sore or cut in the line of its passage. Even pain may be produced by a very feeble current, as is well illustrated by an experiment easily repeated, in which a leech is securely imprisoned by merely placing it upon a crown-piece resting upon a sheet of zinc. From experiments on frogs, M. Morianini infers that the influence of the galvanic fluid on the animal economy is different according as it moves in the course of the ramification of the nerves, or in the opposite direction. In the former case, according to him, it determines convulsive motions alone; in the latter, sensations. These conclusions, however, have been overturned by the recent researches of Nobili, of which we shall presently have to make more particular mention.

When any part of an animal, either still living or but recently dead, is made a part of the galvanic circuit, a shock is experienced, closely resembling that caused by the discharge of a Leyden phial, and the intervening muscles are thrown into momentary convulsive action. Thus if, while the negative pole is touched by the fingers of one hand, the other be brought into contact with the positive end of a voltaic machine, a concussion will be felt in both hands, which will extend to the wrists, the elbow, or even the chest, according to the intensity of the developed electricities. Nor are the pile or any of its modifications essential to the production of such phenomena. In the frog they may be produced, as in the experiment of Galvani, by a single pair of electromotors; and the same is true of the earth-worm, the leech, the niais, and many other cold-blooded animals. The frog, however, is, of all known organized beings, that which is most easily excited by the galvanic stimulus; and hence, and because, generally speaking, it may be procured without difficulty, it has been usually made the subject of such experiments.

The first point of importance to be noticed in reference to the influence of galvanism on

the muscular system is, that a shock is felt, and convulsions are produced, not only when the circuit is completed, but also at the instant when it is broken, and that during the maintenance of the circuit no such effect is perceived. Thus, if a slip of zinc be laid upon the crural nerves of a frog, prepared as described in the note at the commencement of this article, and a copper wire upon either of the lower limbs, when brought into contact, the extremities are convulsed; during the contact there is no contraction, but upon separating the metals from each other, or one or both from the animal, so as to interrupt the circuit, the spasm is renewed. In order, however, to the experimental verification of these phenomena, it is necessary that the circuit be completed or interrupted with rapidity; for if the electric current be gradually admitted into or withdrawn from the body of an animal, no spasms will ensue. This fact is interesting, and is well illustrated by the following ingenious experiment made by Mr. Morianini.* Let a prepared frog be placed between the terminal cups of a *couronne de tasses* composed of a few couples, and which is interrupted at some one point, a single pair of the electromotors being wanting. Upon supplying the place of this couple by two fingers of the same hand, both being perfectly dry, no effect will be produced upon the frog. But if the fingers be kept for a few instants in the cups, upon withdrawing them contractions will take place. When first immersed, the cuticle being quite dry, and in such state a non-conductor, the circuit is in fact not immediately completed. This, however, is effected gradually in proportion as the epidermis becomes soaked with moisture, and hence, upon removing the fingers and thus suddenly interrupting the current, the frog is convulsed. The fluid of the cups in which the fingers are immersed should be pure water.

Having determined the chief conditions necessary to the production, by the pile or one of its elementary couples, of involuntary muscular contractions, we have next to consider whether such effects are at all influenced by the direction which the current takes through the body, or by the nature of the particular tissue which it traverses. The latter topic shall be first discussed.

The muscles of the animal body may, it is well known, be divided into three classes,—the voluntary, the involuntary, and those of a mixed character. The muscles, for example, which move the extremities are of the first kind. The heart is an involuntary muscle, and the diaphragm, though chiefly involuntary, as performing, under ordinary circumstances, its movements independently of the will, is also partly voluntary, inasmuch as these movements may for a time be suspended.

Now upon all three the galvanic fluid exercises a similar power, that is, it stimulates them to convulsive action. The involuntary

muscles are undoubtedly much less affected by it than those which are under the controul of the will; and it has even been contended by some that they were entirely exempt from its influence; an opinion, however, amply refuted by the experiments of Fowler, Nysten, Humboldt, and other eminent physiologists. We shall nevertheless confine our remarks to the voluntary muscles. They constitute the most numerous class, and are, as has been just observed, much more sensible than the others to the voltaic stimulus.

If the nervous chord whose ramifications supply a muscle be cut, the muscle is paralysed, or will no longer contract at the suggestion of the will. This is well known to every physiologist. A similar result also would be obtained by exercising pressure upon the part of the brain or spinal chord from which the nerve originates. From these facts, therefore, which establish that the power of the will in determining the contraction of a muscle is exercised through the nerve which is distributed to it, it would seem a probable inference that the spasms caused by galvanic combinations are also dependent upon some influence propagated through the same channel. Now the conclusion to which we are thus led by analogical considerations seems demonstrated by the following experiment.

Let a frog, prepared as has been already described, be placed upon a common plate, with its crural nerves hooked upon a copper wire, and a slip of zinc laid upon one of its limbs. Upon bringing the metals into contact convulsions will ensue; but if the copper wire be disengaged from the nerves, and made to touch the muscles of the pelvis, or upper part of one of the thighs, upon effecting the contact of the metals as before, there will be either no convulsion, or one of a very feeble description.

If spasms were uniformly wanting in the latter part of the experiment, the conclusion would seem irresistible that the stimulus of electricity, in order to be efficacious in determining contractions, should be conveyed to the muscles through the medium of the nerves. Their occasional occurrence, however, cannot be considered as fatal to such an inference; for the current, in penetrating the muscles, will necessarily meet with nervous fibrils, so that the slight contractions, which are occasionally observed, may be attributed to its motion along these. Consistently also with this solution it may be observed that the experiment succeeds best with electromotors of low power, as copper and platina. With zinc and copper the electricity evolved may be conceived to possess such tension as to enable it to dip into the muscles, and thus pursue its rout along the nerves which it there encounters. That the muscular fibre therefore is passive under the direct influence of the electric current, and that the spasmodic contractions which it suffers, in ordinary galvanic experiments, are the result of some modification of state produced by galvanism in the nerves which supply it, has not only analogy in its

* *Annal. de Chimie*, xl.

avour, but is supported by direct experiment. It is also the conclusion to which M. Nobili* has come, after an elaborate analysis of the various facts and reasonings that admit of being brought to bear upon the subject.

When, then, the galvanic influence is suddenly transmitted through a nerve, or suddenly withdrawn from it, the muscles to which this nerve is distributed are convulsed, but are not at all affected by the immediate action of the electric current. Is this effect independent of the direction of the current? or is it influenced by it? Such are the questions which we have now to examine, and, if possible, resolve.

There are many experiments upon record, most of which may easily be repeated, demonstrating that the electric current produces the most striking effects when passed along a nerve in the direction of its ramifications, or from its origin to its distribution. Thus Volta found that a prepared frog was convulsed by the discharge of a Leyden phial when the nerves were directed to the positive surface, but not when they were presented to the negative coating. Dr. Ure, also, has noticed a similar fact, and illustrated it by the following well known experiment. Let a prepared frog be held by its crural nerves in the left hand, while one of its legs is at the same time laid hold of by an assistant. A bit of silver held in the other hand is now made to touch a slip of zinc in the second hand of the assistant; and, upon contact, there will be either no convulsions, or they will be very feeble. Let the experimenter and his assistant now exchange metals, and, upon repeating the contact, very vivid convulsions will take place. Here, in the case where the spasms are decided, the electricity obviously moves from the nerves to the muscles, or in the direction in which they ramify, the zinc being the positive metal.

The preceding is but a modification of the celebrated experiment of Mr. Lehot. To the crural nerves of a prepared frog he attached a slip of zinc, and, holding one of its legs in his left hand, he brought the zinc in contact with a surface of mercury, and found that, upon touching the same surface with his right hand, so as to close the circuit, convulsions ensued. Upon, however, disengaging the zinc from the nerves, and bringing both into contact with the mercury, a leg of the frog being held, as before, in one hand, and the zinc plates in the other, no contractions were observed. The same phenomena also presented themselves upon using a couple composed of any two of the following substances: zinc, lead, tin, mercury, bismuth, copper, silver, and plumbago. The conclusions arrived at by Lehot by means of single couples, were subsequently drawn by Bellingieri, who operated with piles. The experiment succeeds perfectly with a combination of a few couples. But when the pile is powerful, there is a convulsion, in whatever direction the current be made to traverse the nerve. It is, however, always much feebler in the case

of the inverse than of the direct rout, and may probably be accounted for by a few recurrent fibrils conducting some of the electric fluid to the muscles to which they are distributed. On the whole, then, though it would probably be premature to infer, from what precedes, that inverse currents are incapable of producing muscular spasms, it certainly appears sufficiently proved that they are much less adapted than direct ones for the production of such effect.

The most curious fact connected with this interesting subject still remains to be mentioned. To produce the convulsions of a muscle by galvanism, it is not necessary that the electric current should extend to it, or, in other words, that it should be comprehended in the circuit. It is quite sufficient that the latter be completed through ever so small a portion of the nervous trunk which supplies the muscle. By operating in this way both with direct and inverse currents, and noting the phenomena which presented themselves, both upon closing and upon opening the circuit, M. Nobili arrived at the results included in the following table. In order to their being perfectly understood, it should be premised that the experiments were performed at four consecutive periods, separated from each other by equal intervals, and that the excitability of the animal was, as will be readily anticipated, constantly diminishing.

FIRST PERIOD.

<i>Direct current.</i>	<i>Inverse current.</i>
Closing, Contractions.	Closing, Contractions.
Opening, ditto.	Opening, ditto.

SECOND PERIOD.

<i>Direct current.</i>	<i>Inverse current.</i>
Closing, Strong contractions.	Closing, No contractions.
Opening, Feeble do.	Opening, Strong do.

THIRD PERIOD.

<i>Direct current.</i>	<i>Inverse current.</i>
Closing, Strong contractions.	Closing, None.
Opening, None.	Opening, Strong.

FOURTH PERIOD.

<i>Direct current.</i>	<i>Inverse current.</i>
Closing, Contractions.	Closing, None.
Opening, None.	Opening, None.

Such were the results almost uniformly obtained by Nobili. Exceptions, however, occasionally occurred, but these were almost always observed in the case of frogs in a feeble or exhausted state from want of food, or long confinement. It is fit also to state that his experiments were made in autumn, at a temperature varying between 50° and 59° Fahrenheit, and with a single pair of feeble electromotors, as copper and platina. With piles, or even a more powerful couple, as zinc and silver, the above order of effects is not exactly observed. The difference, however, is not material, it consisting merely in this, that the last contraction which disappears is that consequent, not upon establishing the direct, but upon interrupting the inverse current.

* Annal. de Chimie, xlv. page 60.

The order of effects represented in the table, and what he denominates the law of the contractions, Nobili found to continue the same whether the circuit be completed through an insulated portion of nerve, or, as in ordinary experiments, through the nerves and muscles; a circumstance from which he does not fail to deduce another argument in favour of the conclusion which we have already drawn, namely, that the muscles are stimulated to contraction by the electric current only when it operates through the medium of the nerves. The argument is undoubtedly a strong one, and, when combined with those already advanced, may, we think, be considered as deciding the question.

From the entire of the preceding facts the following conclusions may be deduced.

1. The muscular fibre is insensible to the stimulus of galvanism when applied directly to it.

2. When an electric current is suddenly transmitted through a nerve to a muscle, or in the inverse direction, the muscle is thrown into spasmodic action.

3. The same effect is produced upon suddenly interrupting the electric current when moving in either of the directions just described.

4. Precisely similar results to those mentioned in the two preceding paragraphs are obtained upon completing the circuit through a portion of the nervous trunk which is distributed to a muscle, and upon interrupting it after being so completed.

5. The most powerful contractions are produced by transmitting the direct current.

6. The next, in point of energy, are those which occur upon interrupting the inverse current.

As an apt conclusion to the preceding topics we shall briefly notice here a theory of the cause of muscular contractions not long since put forward by Prevost and Dumas.* It is founded upon two recent discoveries, the one in anatomy, the other in electro-magnetism.

By microscopical observations upon the abdominal muscles of a frog, these physiologists ascertained that, during contraction, the muscular fibres underwent no absolute shortening, but that each was thrown into a zigzag shape, in virtue of which its extremities were made to approach each other. They also found that the flexions invariably occurred at the same points of each fibre, and that a nervous twig passed through the vertex of every angle produced by the contraction, and in a direction perpendicular to the fibres. Such are the anatomical facts essential to their hypothesis.

For the electro-magnetic discovery which they make use of in their theory we are indebted to Ampère, who found that two parallel galvanic currents, moving in the same direction, attract, and in opposite directions, repel each other.

To account, upon the basis of the preceding facts, with Prevost and Dumas, for the contraction of a muscle, it is only necessary to suppose that galvanic currents are made to pass in the same direction through the nervous fibrils which supply it. These, being parallel, must be the subjects of a mutual attraction, which will bring them closer to each other, and thus determine that sinuous arrangement of the muscular fibres they intersect, which is demonstrable by means of the microscope.

If this theory were a representation of facts, it has been suggested that we should be able to demonstrate the existence of the electric currents which it assumes. Accordingly, numerous experiments have been made with this object, but the results have been very discordant. Upon connecting, for example, two needles passed through a nerve, at a short distance from each other, with the cups of a galvanometer, M. Person* could observe no deflexion of the magnetic needle. Mr. Paulliet† found a deviation when the needles were of iron, but none when they were composed of gold or platina, and therefore attributed the electricity which was set free in his experiments to chemical action. Lastly, Mr. David,‡ operating upon the sciatic nerve of a rabbit carefully insulated from surrounding parts, found the needle quite stationary as long as the animal was at rest, but observed a decided deviation whenever the muscles it supplied were thrown into action. The subject is one of considerable difficulty, and can be prosecuted with a prospect of success by him only who combines, with manual dexterity, a competent knowledge of anatomy, chemistry, and general physics. In the present stage of the inquiry there are no sufficient data for enabling us to decide one way or the other. We do not, however, hesitate to avow our conviction, that the balance of evidence is in favour of the hypothesis which views the nerves as the media for the circulation of electrical currents through the animal body. It should be recollected that, when such are not indicated by the galvanometer, it would be unsafe to conclude, on this account alone, that they do not exist; for, in the first place, this instrument is not adapted for the detection of any but continuous currents, and, in the second, in order that we may be able to exhibit even these, according to the method of experimenting usually adopted, it is indispensable that the nerves be less perfect conductors of animal electricity than the wire of the galvanometer,—a condition which, possibly, is, in point of fact, not fulfilled.

But it will be asked, what is the origin of the electricity they convey? Whence do the galvanic currents proceed? Upon this head, it must be confessed, nothing having a demonstrative character can be adduced. It is true

* Journal de Physiologie, tom. x.

† Ibid. tom. v.

‡ Journal of the Royal Institution, No. iv. page 183.

* See Edwards, Sur les effets des agens physiques sur la Vie. Appendice.

we may suppose the brain, with its production into the vertebral column, to constitute a sort of ever-acting electric organ, from which currents are transmitted along certain of the nerves at the suggestions of the will, and may conceive with Mr. Herschel,* that parts of it are spontaneously discharged at "regular intervals, when the tension of the electricity developed reaches a certain point," and that thus "the pulsations of the heart" and the contractions of the other involuntary muscles are produced. Such views are plausible, nay, even probable, but they do not admit of experimental proof, and must be considered as deriving their principal support from their apparent sufficiency to explain phenomena. Some, indeed, observing in the brain and spinal chord nothing analogous in point of structure to our artificial electromotors, and viewing the animal system as composed of an aggregation of tissues, all of which are conductors of electricity, find a difficulty in admitting that the elementary electric fluids can be either separated or accumulated within it. Such objectors, however, should recollect, first, that for the decomposition of the electric fluid the sole contact of dissimilar substances is sufficient, a condition amply fulfilled in the animal body; secondly, that there is both a decomposition and an accumulation effected by the pile, though composed exclusively of conductors; and, thirdly, that certain animals, such as the torpedo, gymnotus, and silurus, are undoubtedly possessed of the powers in question.

There is indeed another class of objectors to whom it is proper briefly to advert. The views here suggested, it will be alleged, tend to conclusions hostile to religion, inasmuch as they profess to explain the animal functions upon principles purely material. This is an objection which, when honestly urged, usually proceeds from weak and timid men. Our reply shall simply be, that while we recognize throughout the entire of the organized world the operation of a variety of secondary causes of a mechanical kind, we are, by the very contemplation of them, compelled to admit the existence of other agents higher in the chain of causality, and in their nature totally different from and independent of matter.

In the thirty-third volume of the *Philosophical Magazine*, page 488, there is a paper from the pen of Dr. Wollaston, containing the earliest conjectures to be met with in reference to the influence of galvanism upon the secreting organs. Reflecting upon the wonderful powers of decomposition and transfer which Davy had lately shewn that the pile was capable of exerting, and upon the fact of a distinct electric apparatus having been detected in certain fishes, it occurred to this eminent philosopher that the products of secretion might be due to electricity of low intensity; and he even suggested the nature of the secretions, as to acidity or alkalinity, as a test of the species of electric fluid accumulated in each organ. Thus

the milk, the sweat, and the urine, as being all acid, should, upon this principle, be considered as proceeding from organs in an electro-positive state; while the bile and different serous secretions, as containing a free alkali, would argue an electro-negative state of the parts from which they are discharged. In support also of his hypothesis he quotes the result of an experiment in which very feeble electricity, such as is developed by a single couple composed of zinc and silver, effected the decomposition of common salt dissolved in two hundred and forty times its weight of water, and the transfer of its alkaline base through a slip of bladder tied over the end of the glass tube in which the solution was contained. Mr. Maturci has recently* revived the experiment and the views of Wollaston, and added the important observation that the animal principles occurring in the several secreted fluids abound in elements of corresponding electrical relations, or that in the acid, oxygen and azote, in the alkaline, carbon and hydrogen, are chiefly to be found. Dr. Wilson Philip, however, is unquestionably the individual who has espoused this theory with most zeal, and illustrated it with most success. His researches are extremely interesting in themselves, and have fixed, in an especial manner, the attention of physiologists. We shall, therefore, briefly notice them in this article, and shall commence with a description of his principal experiment.

The par vagum, or eighth pair of nerves, which are chiefly distributed to the stomach and lungs, were divided in the necks of several rabbits, shortly after having fed upon parsley. Their respiration was thus immediately rendered laborious, nausea and fruitless attempts to vomit supervened, and the animals finally died, apparently of suffocation. Upon opening their stomachs, also, the parsley was found quite unaltered, from which he concluded that the secretion of the gastric juice had been suspended. The same experiment was then performed upon other rabbits, with this difference, that galvanic currents were sent to the stomach, by applying one of the poles of a small pile to a slip of tin foil rolled round the lower ends of the divided nerves, and the other to a disc of silver laid upon the epigastrium. In all these cases dyspnoea and tendency to vomit were wanting, and the animals being killed, after the currents had been continued for twenty-six hours, the parsley was found perfectly digested, and the stomach of each exhaled the odour peculiar to this organ during digestion. From experiments such as these, very frequently repeated, and always with the same results, Dr. Philip concludes that the secretion of the gastric juice is under the control of the nervous influence, and that this latter is identical with, because it may be replaced by, the power developed by galvanic combinations. Dr. Philip, however, does not confine himself to this inference, which, if not rigorously established, would at least appear supported by plausible

* Lardner's *Cyclop. Discourse on the Study of Natural Philosophy*, p. 343.

* *Annales de Chimie et de Physique*, March 1830, p. 256.

arguments; but goes the extent of asserting that "galvanism is capable of performing all the functions of the nervous influence in the animal economy;" or, to abide by his own enumeration of these, that, besides "combining the elementary parts of the blood in the formation of the secreted fluids, it conveys impressions to and from the sensorium, excites the muscular system, and produces an evolution of caloric from arterial blood." His researches, it must be admitted, have not been sufficiently extended to justify so sweeping a conclusion; for, beside the experiments just detailed, and which relate to digestion alone, but one having a different scope would appear to have been performed by him. Upon passing the galvanic current through blood recently drawn from the carotid arteries of a rabbit, he states that he observed a rise of temperature of 3° Fahrenheit, or from 98° to 101°. This experiment, however, is far from being conclusive, and must, at all events, be considered as furnishing much too narrow a basis for the theory which he builds upon it, namely, that animal heat is due to currents of electricity which are ever circulating through the contents of the arterial branches of the sanguiferous system.

Nor have the conclusions of Dr. Philip, in reference to the gastric secretion, nor the alleged facts upon which he professes to found them, met with universal adoption. In 1823,* M.M. Breschet and H. M. Edwards undertook the investigation of this contested subject, and by a number of experiments, apparently conducted with all the precautions necessary to insure accuracy of result, conceived that they had established the following propositions:—

1. The simple section of the pneumo-gastric nerves retards, but does not entirely prevent, the digestive process.
2. The excision of a portion of them almost completely suspends this function.
3. In both the preceding cases digestion is restored by the transmission of electric currents along the nerves to the stomach.

But from subsequent researches, made in conjunction with M. Vasseur,† these physiologists were led to believe that galvanism acted merely as a stimulant upon the glands which secrete the gastric fluid, and that similar effects might be produced by any thing causing a mechanical irritation of the lower ends of the divided nerves. There is also another important point on which they differ from Dr. W. Philip. The latter asserts that the section of the par vagum suspends digestion by preventing the secretion of the gastric juice, the muscular power of the stomach continuing unimpaired; while Breschet, Edwards, and Vasseur contend that the stomach is paralyzed by the division of these nerves, and that the interruption of the digestive process is to be ascribed to the cessation of those motions in virtue of which the several parts of the alimentary bolus are brought into successive contact with the secreting surface of this organ. Were these

conclusions clearly established, the theory which represents secretion as a galvanic function could scarcely be maintained. In justice, however, to Dr. Philip, it should be mentioned that Mr. Cutler,* operating under the direction and with the assistance of Dr. Philip himself and of Mr. Brodie, was not enabled, by any means of mechanical irritation, to produce those effects which are, upon all hands, admitted to follow upon the due application of electric currents. The chief of the above objections is thus invalidated, if not overturned; so that we do not hesitate to assert, contrary to an opinion very generally expressed, that the question is still open for discussion, and has by no means been set at rest by the researches of the French physiologists.

Application of galvanism to the treatment of diseases.—Having disposed of the supposed agencies of galvanism in carrying on the functions of the healthy body, we are in a better predicament for appreciating its influence as a medicinal agent. This is the only topic, legitimately within the scope of the present article, which remains to be discussed.

The first therapeutic application of the pile, of which we shall make mention, was suggested by Prevost and Dumas.† Reflecting upon its powers of decomposition, particularly as illustrated by the celebrated discoveries of Davy, it occurred to these physiologists that it might be successfully employed for breaking down the materials which compose urinary calculi, and that thus the necessity for one of the most formidable of surgical operations would be obviated. Their idea, in fact, was to introduce into the bladder a canula containing two platina wires, carefully insulated from each other, and whose internal ends should be brought in contact with the stone, while their external extremities were put in connexion with the poles of a powerful battery. Upon the established principles of electro-chemistry they expected that it would be resolved into its acids and bases, the former assembling at the positive, the latter at the negative pole, and that, in this way, its gradual disintegration would be effected. A preliminary experiment, made upon a fusible calculus placed in a basin of water, and a second, upon a stone of the same kind, introduced into the bladder of a dog previously injected with tepid water, gave encouraging results. The former, submitted for eight hours to the action of a battery composed of one hundred and twenty couples, and charged with muriatic acid diluted with thirty times its weight of water, was reduced from ninety-two to eighty grains, and, in eight additional hours, was so disintegrated as to break into small crystalline fragments, upon the application of the slightest pressure. The latter underwent similar changes, and they found that no irritating effect whatever was produced upon the bladder, however powerful the pile which they employed. This proposal, however, has, we believe, never been acted on. It is obvi-

* Archives Générales for August.

† Archives Générales, 1825.

* Med. Chir. Review, vol. iii. p. 589.

† Journal de Physiologie, tom. iii. p. 217.

ously not applicable at all to the lithic calculi, which constitute by much the most numerous variety. The manipulations, also, are so difficult of execution, the process is necessarily so slow, and the result so uncertain, as to leave us at no loss for conjecturing why the preference should hitherto have been invariably given to lithotomy. Nor, considering the recent admirable invention of grinding down the stone, is it likely that the value of the galvanic method will be tested upon any future occasion.

The next application of galvanism to be noticed is in the treatment of asphyxia, whether proceeding from strangulation, drowning, narcotic poisons, the inhalation of noxious gases, or simple concussion of the cerebral system. In all these cases the interrupted current, that is, a succession of shocks, should be resorted to, the battery should be pretty powerful, and care should be taken that the electricity be as much as possible confined to the nerves, and that it be sent along them in the direction of their ramifications. The experiments of Nobili and Ure, already detailed, sufficiently demonstrate the propriety of attending to these particulars. The chief object in asphyxia being to restore the circulation of the blood and the respiratory movements, the galvanic influence should be principally directed to the organs upon whose actions these depend; and towards accomplishing this, no plan appears more likely to be efficacious than that which has been recommended by Dr. Ure, and which consists in laying bare the sheath which encloses the par vagum and great sympathetic nerve, touching it with the wire connected with the positive pole of a battery, and, while one extremity of the negative wire is pressed under the cartilage of the seventh rib, drawing the other along the upper edges of the plates of the last trough, towards its copper end. In this way, a rapid succession of discharges, each succeeding one of which exceeds the preceding in intensity, is sent to the lungs, the heart, and the diaphragm, that is, to the organs whose functions we are most anxious to revive. Before attempting the operation of laying bare the nerves, the effect of merely pressing the positive wire upon the region of the neck corresponding to their position should be tried. Operating according to the former method, and with a battery composed of two hundred and seventy four-inch plates, upon the body of a criminal executed in Glasgow, Dr. Ure renewed the action of the diaphragm, and produced other effects of such an impressive description as to have induced him to hazard the opinion that, were it not for the injury which the subject of his experiment had sustained from the preparatory dissections, he would, in all probability, have been restored to life. This opinion, however, was probably a too sanguine one, for his experiments, repeated in the winter of 1829, with all the necessary precautions, by the professors of the Irish College of Surgeons, gave much less striking results. The voluntary muscles were, it is true, thrown into strong convulsive action, but all attempts to restore the respiratory movements were entirely unsuccessful. The mechanical

injuries, indeed, sustained occasionally by the spinal marrow, and always by the larynx of individuals who perish by hanging, at least when they have fallen from a considerable height, preclude the possibility of complete recovery from any means whatsoever.

In asphyxia produced by concussion of the brain, there are strong reasons for believing that galvanism, properly applied, would prove extremely useful. This conclusion seems to have been drawn first by Mr. Goudret,* who had his attention particularly called to the subject by witnessing the death of an individual in the Ukraine who had fallen on his head from his horse, notwithstanding the sedulous application of all the analeptic means familiar to the physician. Upon his return to Paris he undertook an experimental examination of the efficacy of the pile in such cases, and found his expectations more than verified. In his first experiment, a rabbit, which had been to all appearance killed by a few violent blows inflicted with the hand upon the back of the head, was perfectly recovered by a succession of shocks, continued for half an hour, from a machine of thirty couples, and transmitted between the eyes, nose, and meatus auditorius externus, on the one hand, and different parts of the spine of the animal, on the other. In a second trial made with a stronger rabbit, the method just described did not produce the desired effect within the space of thirty minutes; but, upon removing the cuticle from the spine by the water of caustic ammonia, and then applying the pile as before, at the end of the second half hour the animal was restored to life, though it continued paralytic for a few days in its hinder extremities. Similar experiments have more than once been performed by the writer of this article, without any knowledge of the previous researches of Mr. Goudret.

In a note appended to the communication of M. Goudret, Majendie states that he, Paviilet, and Roulin had repeatedly succeeded in recovering, by means of the pile, rabbits asphyxiated by submersion in water for more than a quarter of an hour, and adds the important remark that in such experiments patience on the part of the operator is particularly indispensable, inasmuch as, in cases finally successful, reanimation was often not achieved for full thirty minutes. These results illustrate, much more forcibly than the experiments of Ure upon the murderer Clydesdale, the value of galvanism in the treatment of persons recently drowned, and the propriety of his recommendation that a voltaic battery should be included amongst the means of resuscitation provided by the Humane Society.

There can be little doubt that the pile would prove equally useful as a stimulant in cases of poisoning by narcotic drugs, or the inhalation of irrespirable gases, as in those already noticed. Experiments performed upon the lower animals justify this conclusion, though galvanism is not usually mentioned by toxicologists amongst

* Journal de Physiologie, vol. iv. p. 382.

the curative means to be resorted to on such occasions.

Of all the diseases to which the human body is subject, paralysis is that in the treatment of which the galvanic shock is most frequently applied. Its peculiar effects upon the muscular system, already so minutely dwelt upon, and the fact of its possessing the power of throwing even the muscles of a paralytic limb into convulsive action, have both suggested its use, and caused the highest expectations to be formed of its efficacy in the treatment of this affection. Nor have these anticipations proved entirely illusory. Galvanism has often of itself completely removed certain forms of such disease, and it is almost always a useful auxiliary to other lines of treatment. It should, however, be borne in mind that it is not equally applicable in every variety of paralysis. In cases, for example, of hemiplegia following a recent apoplectic attack caused by the extravasation of blood into the substance of the brain, it would obviously be absurd to expect any advantage from such a source. But when there is reason to believe the effused blood has been removed, and that the hemiplegia still continues, the pile may be advantageously resorted to for the purpose of stimulating the nerves, and thus rousing them to the performance of those functions which would appear, in such case, suspended from desuetude alone. It is, in fact, in paralytic affections of a purely functional kind, or which do not depend upon organic disease of the nervous system, or pressure exercised upon any part of it, that the agency of the pile can be rationally resorted to by the medical practitioner. Under this head may be ranged general or local paralysis arising from exposure to cold, palsy of the wrists from the absorption of lead, and many varieties of deafness and amaurosis. In all these cases, as the nerves are to be stimulated to increased action, an interrupted current must be employed, in the application of which the method of Ure should be followed, and all those particulars attended to which have been detailed in connexion with the subject of asphyxia. The discharges of a galvanic battery and a Leyden jar produce sensations so analagous as to render it probable that they affect the living body in the same way, and that they may, therefore, be indifferently applied as stimulants to the nervous system. The pile, however, possesses many advantages which do not belong to the electrical machine. The quantity of electricity which it sets in motion is vastly greater, a peculiarity which may probably confer upon it a higher degree of medicinal power. There is no difficulty in bringing it into action in any kind of weather. The shocks it gives may be more exactly graduated, and admit of being directed with facility to organs which it is difficult, if not impossible, to subject to the influence of the common electric spark. This latter circumstance is most deserving of attention. To submit, for example, in cases of deafness, the auditory nerve to galvanic action, it is sufficient to introduce a wire connected with one of the poles of a battery into the affected ear, and the

other wire into the opposite ear, the circuit being then rapidly broken and completed a number of times by an assistant, according to the method recommended by Dr. Ure, and which has been already so often alluded to. In amaurosis the galvanic shock may, by obvious means, be transmitted at pleasure through the ball of the eye, so as to traverse the retina, or be confined to those twigs of the first branch of the fifth pair of nerves which ramify on the forehead above the orbit, and upon the state of which alone Majendie has shewn* that gutta serena often depends. In aphonia the circuit may be completed through the organs chiefly concerned in the production of the voice, by placing a shilling upon the tongue, and touching it with the negative wire of a battery whose other pole is alternately brought in connexion with, and separated from, different parts of the external larynx, a method successfully employed by Mr. Miles Partington in a case, the particulars of which he details in the *London Medical and Physical Journal*, No. 294. These are instances of affections which have often yielded to the voltaic pile, but upon which the powers of the ordinary electrical machine scarcely admit of being brought to bear.

The shocks of the pile are not only adapted to the various forms of paralysis, but also to the different other diseases for which the sparks of the machine, and the discharges of the Leyden phial are prescribed. These it is not necessary to recount here, as they have been already enumerated in the article on *ELECTRICITY*, to which, therefore, we shall content ourselves with referring.

Whenever galvanism is intended to produce an exciting effect, it must be exhibited so as to produce shocks, or in the form of the interrupted current. There are, however, certain affections in which it is conceived most beneficial when flowing in a continuous stream, the specific effects of it when thus applied being supposed of a sedative kind. This opinion of the difference of action of the voltaic fluid, in the two conditions of it just described, does not rest upon mere conjecture. It is based upon the observation of medical electricians, and is, in particular, sustained by the following experiments. If a prepared frog be subjected to a quick succession of discharges by means of a feeble pile, or even a single couple composed of zinc and silver, its muscles are rendered permanently rigid, and it exhibits all over the condition of a tetanic patient; but upon now passing through it for some time a continuous current in the opposite direction, the muscles gradually relax, and finally attain their natural state. Again, if a recently prepared frog be submitted for some time to an uninterrupted current of galvanism, its excitability seems in a great measure destroyed; for upon subsequently applying shocks, by alternately opening and closing the circuit, either no spasms or very feeble ones will be produced. From facts such as these, Nobili† concludes that all con-

* *Journal de Physiologie*, vol. vi. p. 156.

† *Annales de Chimie*, tom. xlv.

vulsive affections, not excepting tetanus itself, may probably admit of being controuled by galvanism, but that in these the method of its administration should be the opposite to that for paralysis, or, that instead of the interrupted, the continued current should be resorted to, and that to obtain the maximum tranquillizing effect, the electricity should be transmitted along the nerves in a direction contrary to that of their ramifications.

It is probably upon the same principle that the efficacy of the following galvanic treatment of an epileptic patient by Dr. Pearson,* depended. The cuticle having been removed by a blister from the back of the neck and inner side of one knee, these parts were covered with bits of moistened sponge, upon which slips of linen were laid, and over all discs of silver and copper, the former metal being applied to the neck, the latter to the knee. The discs were then connected by a copper wire, which was attached to each by soldering, and enclosed in a pouch composed of chamois leather, so as to be insulated from adjacent parts. This apparatus having been applied for six months, a case of epilepsy which had resisted every other line of treatment was completely cured. It was found to continue in action for ten or twelve hours, after which it became necessary to clean the plates, and renew the pledgets of sponge and linen.

Galvanism in the form of the continued current has also been strongly recommended by Dr. Wilson Philip for the treatment of what he denominates habitual asthma, that is, simple dyspnœa, unaccompanied by pulmonary spasmodic action, or any tendency to thoracic inflammation. This particular application of it was suggested to him by the results of those experiments of his already discussed, in which, after the excision of portions of the par vagum on each side of the neck in rabbits, a stream of voltaic electricity not only restored the digestive process, but also removed the difficulty of breathing. His method was to apply a disc of silver to the nape of the neck, and another to the epigastric region, and then press the positive wire of a galvanic trough against the former, and the negative wire against the latter. His machine consisted of from eight to sixteen pairs of four-inch plates, and was charged with muriatic acid diluted with one hundred and twenty times its weight of water. The circuit was always maintained until decided relief was experienced, which usually occurred within from five to fifteen minutes. In every instance a suspension of the dyspnœa was thus effected, and in many cases the cure was permanent. The success which Dr. Philip experienced in the treatment, upon this plan, of habitual asthma, led him to peculiar views respecting the pathology of this affection. The disease he conceives to consist in some impediment residing in the nerves to the transmission, from the brain, of galvanic influence, and the artificial electric current he supposes to operate by removing such impediment.

When the wires attached to the extremities of a trough are introduced into any animal fluid containing albumen, this latter principle, as was first shewn by-Brande, separates at the positive pole, in the coagulated state. It has hence been suggested that galvanism might be applied to the important purpose of coagulating the blood within an aneurismal tumour, and thus removing the disease without resorting to the ligature. Experiments have been performed on rabbits by M. Velpeau, which demonstrate that the desired effect may frequently be produced by merely inserting a number of needles into the circumference of an artery, so as to present a mechanical impediment to the circulation through it. There can, however, be no doubt that coagulation and its wished-for consequences would, with much more certainty, be determined by completing the circuit of a pile for a few instants through each pair of opposite needles; but we are not aware that this method has as yet attracted the attention of the practical surgeon.

If the connecting wires of a common pile be made to touch a cut or ulcer within a short distance of each other, the animal fluids undergo the coagulation just described, and, by properly shifting the wires, this effect may be extended to the entire surface. With a machine consisting of from forty to fifty couples the effect resembles that which would be produced by a solution of nitrate of silver containing about five grains in the ounce of water; but, with a battery composed of two or three such troughs, the action is much more intense, and there is almost immediately formed an eschar of very considerable thickness. Galvanism may, therefore, be used as an escharotic, and this application of it has actually been made, and is strongly recommended by M. Pravaz,* to the bites inflicted by rabid animals. He details several cases in which this practice was successful, in one of which the cauterization was not resorted to until fifty-four hours after the reception of the bite. The battery which he used was of low power, consisting of only two troughs, containing between them but fifty pairs of electromotors. The eschar was usually detached on the eleventh day, and the cicatrization completed on the seventeenth.

In 1811 Mr. Berlioz† revived in Europe a curative process long practised in the east, particularly in China and Japan, and which is usually known under the name of acupuncture. He was also the first who proposed to combine with it the galvanic influence, a suggestion which has recently been very extensively acted upon, especially by the French physicians. *Electro-puncturation*, as it is usually denominated, is performed by inserting in the ordinary manner two or more needles into the part or organ affected, and then touching these with the wires from the poles of a feeble galvanic machine, the contacts being occasionally suspended and renewed, so as to

* *Revue Médicale*, Decembre, 1830.

† *Edinburgh Med. and Surg. Journal*, vol. xxvii. p. 191.

* *Revue Médicale*, vol. iii., p. 323.

produce a succession of shocks. It has been chiefly employed by Cloquet at the Hospital of St. Louis, and from the reports of his friend Pelletan and his pupil Dantes, and from the treatise of the Chevalier Sarlandier, it would appear to be a most powerful means of combating morbid action. The diseases in which it has been found most advantageous are the different forms of rheumatism and neuralgia; (in the latter affection the needles should be inserted in the course of the principal nerve, and the galvanic current transmitted in the direction of its ramification;) next in spasmodic affections, as muscular spasm, hysteria, and traumatic trismus; convulsive hiccup and vomiting; periodic epilepsies, preceded by pain in the mamma, and, lastly, in inflammatory attacks, such as contusions attended with extravasation and great pain upon motion, ophthalmia, pleurisy, carditis, and even erysipelas. It has also been used, and, according to Mr. König,* with success, for promoting the absorption of the effused fluid in ascites; and Carraro† has proposed it for the treatment of asphyxia. In paralysis it is admitted to be of little use, except for relieving the pain, which is frequently the most distressing accompaniment of such disease. Amaurosis, however, when depending upon neuralgia, is said to be an exception to this statement. A well-marked case, also, of paralysis of the muscles of the right side of the face, accompanied by neuralgia of the portio dura on the same side, is related by M. Montault,‡ which was cured in about a week by inserting a needle through the nerve at its exit from the stylo-mastoid foramen, and four others in the course of its principal branches, and transmitting from the former to the latter a number of shocks once a day, from a pile of thirty couples.

Admitting the efficacy of electro-puncturation in all these complaints, it is very difficult to form any plausible hypothesis as to the manner in which it acts. Some theories have indeed been hazarded on the subject; they are, however, so vague, contradictory, and insufficient, that it would be a complete loss of time to enter upon an examination of them.

In the therapeutic administration of galvanism, the feelings of the patient must be our guide as to the strength of the charge which should be employed in each particular case. Some will sustain with impunity the shocks of a battery which would prove most distressing and injurious to others. The dose may be graduated to any required degree of nicety by properly varying the interval between the conducting wires, for upon this, with a given machine and exciting fluid, will depend the degree of energy of the developed electricities. The strength, in fact, of the galvanic shock, as is well known, depends not upon the size, but the number of the couples which compose the battery. It is, however, influenced by the

degree of concentration of the acid solution, and also by the interval between the adjacent pairs of metals, being connected with the latter in an inverse, and with the former in a direct ratio. The distance between the couples in the common trough should not exceed an inch, and for general purposes the best solution to employ is water containing one-twentieth its weight of strong nitric acid, and one-sixteenth of oil of vitriol. The wires used for completing the circuit should be furnished with insulating handles composed of glass, and be armed at their free extremities with balls of brass, or, what answers better, of silver, gold, or platina. Should such be wanting, silver discs (shillings will answer well) should be laid upon the parts of the body between which the current is to be made to pass, their position being occasionally changed to prevent the skin beneath from being injured: The subjacent cuticle, also, being a non-conductor, should be moistened with a solution of sal ammoniac or common salt.

We shall now conclude by a recapitulation of those general principles of practice laid down in the article on electricity, and which are equally applicable to the present subject.

1. Feeble powers should always be first tried; these should be gradually augmented, and the use of such finally persisted in as, without producing any violent effects, appear to make a decided impression on the disease.

2. Galvanism, as a remedial agent, must not be hastily given up because of its beneficial effects not immediately appearing, for these, generally speaking, require considerable time to be developed.

3. The pile should not be relied upon exclusively in the treatment of diseases, but should rather be considered as auxiliary to other methods of cure.

4. To the preceding we shall add, that, in cases where the continuous current may be deemed most advisable, it would be well to resort to machines composed of plates having an extended surface, there being reason to suspect that the curative influence of galvanism in this form depends not upon its intensity, but upon the quantity of it which is set in motion.

(James Apjohn.)

GASTRALGIA. See GASTRODYNIA.

GASTRITIS, from γαστήρ, the stomach. This term is commonly used to express an inflammation of all the tunics of the stomach, with the exception of its serous covering; but as it is now generally believed that this diseased action commences in the mucous membrane and glands, the term is employed to designate an inflammation of the internal tunic, which may or may not affect the remaining tissues, from the violence or chronicity of the disease, the habit of the patient, &c.

The stomach is admitted to be one of the most important of organs: its existence forms a distinguishing characteristic of most classes of animals; its function is the foundation of

* Revue Médicale, April, 1830, p. 120.

† Edinburgh Med. and Surg. Journal, *supra* citat.

‡ Revue Médicale, January, 1830, p. 63.

all animal organization; it is placed, as it were, in the centre of the economy; it is abundantly supplied with nerves of animal and organic life; and its sympathies are more remarkable, direct, and numerous than those of any other organ. These considerations explain the severity of many cases of gastritis; its great variety of symptoms; the fatal nature of the disease in its more acute forms, and its danger in all cases.

In a former article the history and pathology of enteritis were described; in this we shall consider solely the localization of inflammatory disease in the stomach.

In the article ENTERITIS the difficulty of investigating the symptoms of inflammation of the stomach, as distinguished from those of enteritis, was alluded to. This arises from the frequent co-existence of the two affections, a fact admitted by almost every pathologist. It is indeed difficult to explain how Dr. Abercrombie has arrived at a very opposite conclusion. In his work on the Diseases of the Stomach and Intestines, he says, "I have been often very much astonished to find in my own observation how seldom the stomach shews marks of inflammation, even when the organs most nearly connected with it have been inflamed in the highest degree."

But in the present state of medicine we cannot admit the opinion of Broussais, that the two affections are always co-existent, as cases are on record which are inconsistent with it. Thus, in the last edition of Andral's *Clinique Médicale*, tom. i., we find the thirty-ninth and forty-second cases are examples of severe gastritis, without inflammation of the intestine; while, on the other hand, the first, third, ninth, tenth, eleventh, nineteenth, twenty-eighth, thirty-fifth, and forty-third cases are examples of enteritis, in some instances very intense, without any gastric inflammation; so that, excluding all doubtful cases, we have in the recorded investigations of a single author, out of fifty-three instances of inflammation of the digestive tube, nine where the stomach remained healthy, and two where this viscus alone was engaged.

I. *Acute gastritis*.—Inflammation of the stomach in its highest degree is rarely met with, unless in cases of corrosive poisoning; but by the study of these we may learn the prominent symptoms of the most violent gastritis, which, when separated from those apparently arising from other causes, are the following: intolerable thirst, constant nausea and vomiting, præcordial distress, sunk countenance, extraordinary prostration, fever. These symptoms, occurring in a case where no poison had been administered, would point out the existence of the most severe gastritis.

The disease, however, occurs with such various degrees of intensity that it is difficult to give any single description of it. In one case it will destroy life with rapidity and with the most dreadful sufferings to the patient; in another it may represent a slight dyspepsia: between these extremes the shades are infinite. In some of the more violent cases there has

been fever, at first inflammatory, but speedily assuming the typhoid type; the patient complains of a burning sensation in the stomach, with ardent, unquenchable thirst, and a desire for cold and acidulated drinks. From the extreme sensibility of the stomach, the fluid swallowed is in most cases immediately ejected, and often the least irritating substances will cause heat, pain, and vomiting. There is generally great tenderness of the epigastrium, so that the slightest touch, the weight of the bed-clothes, or any muscular effort, will produce severe distress. Respiration is accelerated and difficult, although no disease can be detected in the thoracic viscera by auscultation; or if there be, it will not be sufficient to account for the symptom. The patient is restless and anxious; the features are contracted and often distorted, and the prostration of strength (so constant in gastro-intestinal inflammation) is peculiarly marked. Constipation of the bowels occurs,—a symptom common to both acute and chronic inflammations of the upper portion of the digestive tube.

"The symptoms," says P. Frank, "increase with rapidity: scarcely has the patient, with an intolerable burning sensation, swallowed a small quantity of an insipid fluid, than it is rejected, either pure or mixed with eruginous bile. The pulse is small, frequent, contracted, and hard, or intermittent and unequal. The agitation, dyspnoea, restlessness, thirst, and dryness of the mouth go on increasing; hiccup, which greatly aggravates the sufferings of the patient, appears; the extremities become cold; and in some cases delirium and jaundice are observed. In the last stage all sensation of heat and pain in the epigastric region disappears; the flatulent swelling of the belly increases; drinks are rejected by regurgitation, and a serous fluid is often discharged with force; the extremities become as cold as marble, and fainting and convulsions announce the fatal termination."

This is the phlegmonous gastritis of the older authors, as distinguished from the erysipelatous. In modern medicine the terms acute and sub-acute have been substituted. Little advantage, however, is derived from this distinction, as the disease is essentially the same, though occurring under a thousand modifications of intensity.

Patients labouring under severe gastritis often complain of a sensation very analogous to the globus hystericus. They feel as if a round body was rising up and compressing the lower part of the chest; vomiting often relieves this symptom for a time, and hence the patient frequently urges his attendants to give him a full emetic, in the hope of expelling the supposed foreign body, to which he attributes his distress. This sensation is probably caused by spasmodic stricture of the cardia, which may extend to the œsophagus. It has been observed that in some cases swallowing was impossible, and the patients referred the obstruction to the lower portion of the pharynx or upper part of the sternum,—a symptom supposed by Broussais to indicate that the

whole stomach is violently contracted, so as not to admit of any dilatation. This contracted state of the organ has been verified by dissection, the capacity of the stomach having been found reduced to that of a portion of the small intestine.

Connected with the symptom of dysphagia, we may place hiccup, which is one of the most distressing symptoms in these cases: it is most commonly observed in the latter stages of the disease, but we have seen it occurring at the outset, and are led to believe that it then marks a predominance of inflammation round the cardiac orifice. A case of this description lately occurred under our care in the Meath Hospital, in which, after the sudden disappearance of a pneumonia of the lower lobe of the left lung, the patient was attacked with vomiting, followed by severe hiccup. There were extraordinary prostration of strength, thirst, and a craving for cold and acidulated drinks; the epigastrium was tender, and the bowels were confined; the tongue was clean and moist: the hiccup continued incessant even during sleep, though then somewhat modified. Notwithstanding active treatment for the gastritis, death took place on the fourth day of the abdominal disease. On dissection, we found that the inflammatory action was circumscribed in a most remarkable manner for about three inches round the cardia. Here the mucous membrane was of a blood-red colour, thickened and softened, while that of the rest of the stomach was perfectly healthy. The lower portion of the œsophagus was vascular, and the cuticle separated so as to form shreds on the surface of the tube. A similar state of parts was recently observed in another case in Dublin, in which incessant and intractable hiccup was the prominent symptom.

Deep-seated and lancinating pains have occurred in this disease, referred to the epigastrium and hypochondria; and Broussais notices it as an interesting fact, and as indicative of their nature, that they are frequently relieved by cold acidulated drinks. Connected with these painful sensations is another characteristic symptom—the patients constantly throw the bed-clothes off from the chest and epigastrium. This has been supposed to arise from their inability to bear even the slightest pressure on the part, an explanation which may be partly true; but it also seems probable that the desire of cold to the surface is another cause. In some cases we have observed this tendency to be irresistible, although the intellects were perfect: the symptom, however, is not peculiar to gastritis, but occurs in many cases of gastro-enteric inflammation in the acute stage.

The tongue has been described as presenting peculiar characters in this disease; but this appears to be one of those statements taken by writers on trust, of which there are far too many in medicine. Let us examine the state of our knowledge on this subject.

With respect to the question as to whether the state of the tongue indicates any certain condition of the stomach, or *vice versa*, Andral

comes to the following important conclusions:—1. That no constant relation can be established between the state of the tongue and that of the stomach. 2. That there is no modification of the tongue which corresponds with a special modification of the stomach. 3. That a certain state of the stomach may be found after death, with various appearances of the tongue during life. 4. That a morbid state of the stomach may coincide with a healthy state of the tongue, and a healthy condition of the stomach with a diseased condition of the tongue.* Louis comes to almost the same conclusions in his *Recherches sur la Gastro-entérite*. He says, “In most of those cases where the mucous membrane of the stomach presented the greatest lesions, the tongue was generally in its natural state;” and again, page 66, he says, “so that whatever was the state of the tongue, it had not the slightest relation with that of the stomach; the same appearance coinciding with a more or less severe lesion of the gastric mucous membrane in one case, and with the healthy condition in another.”

It may be objected, however, that these observations were made on that class of affections called *fevers*, and that the conclusions would not apply to idiopathic gastritis. But when we recollect the great similitude that exists between cases of idiopathic gastro-enteritis and fever, and also that in other diseases, not of the stomach or intestines, all the morbid appearances of the tongue may occur, it is difficult not to make a general application of the conclusions of the above authors; and M. Piorry† declares that in many cases of well attested acute gastritis the tongue continued pale. From these facts we must conclude that in gastritis no constant state of the tongue exists; this is more particularly true in the less severe and chronic forms of the disease, and in the gastric inflammations which occur in fever. In the acute species and in cases of corrosive poisoning, a red and dry tongue has been often observed, and in some the tongue is glazed and morbidly clean. This state often occurs with a great amount of gastro-intestinal disease. It is of great importance, however, that the researches of Andral, Louis, and Piorry on the relations, in disease, between the state of the tongue and the gastro-intestinal surface should be extensively known, particularly in these countries, where the state of the tongue is so constant a guide in practice, and where, of course, if the conclusions of those authorities be correct, such practice must be often erroneous. It should never be forgotten that a perfectly healthy tongue may and often does coincide with a profound disease in the stomach, and a diseased tongue with a perfectly healthy state of that viscus.

The sympathetic affections in this disease are generally severe and numerous, and in certain cases may become predominant. In

* Clinique Médicale—Malad. de l'Abdomen.

† Journal Hebdomadaire de Médecine, No. 60, 1829.

most instances of acute gastritis there is lesion of the cerebro-spinal functions; and in some, an inflammation of the brain may actually take place. Under these circumstances, we may have the most violent nervous symptoms without our being able to detect by the scalpel any lesion in the brain or spinal marrow; and, on the other hand, the various shades of arachnitis and encephalitis may be thus produced. The two following examples of severe nervous symptoms apparently caused by gastric irritation, and in which no lesion was found in the nervous centres, are so remarkable that we shall not apologize for their introduction.

A patient, aged forty-five, of a strong constitution, entered the hospital of La Charité on the 14th of October, 1820. He was then in such a state of delirium that no account of his former state could be obtained from him. On the morning of the 5th, the following symptoms were observed: eyes haggard, risus sardonius, taciturnity; when the belly is pressed the countenance expresses pain, but the same is observed when pressure is made on any of the limbs; *tongue moist and natural*; respiration free; pulse full, somewhat frequent; some heat of skin. He died in the evening. On dissection, the brain and its membranes were found perfectly healthy; no effusion existed either at the base or in the ventricles. The lungs and heart were healthy, *but the stomach presented several recent ulcerations, with red bases, and between which the mucous membrane was vascular*. In the rest of the canal nothing morbid, except a few red patches, was observed. The other organs were all in their natural state.*

Here we see a pure gastritis, in which the prominent symptoms were those of an inflammation of the brain; and in this case and in that which we shall next quote, a remarkable feature in the history of gastritis is illustrated, namely, *that when the sympathetic symptoms acquire a certain degree of intensity, the more usual, or what may be called the local symptoms, are often either greatly lessened, or altogether wanting*. But this absence of proper symptoms does not indicate that there has been a metastasis of inflammation, or in other words, that the stomach has become healthy.

The next case is also from the same author. A middle aged man, four days before his entrance into hospital, was seized with bilious vomiting, epigastric pain, and fever. In about twenty hours after the invasion of these symptoms, he first perceived a difficulty in depressing the jaw, and a violent trismus was soon established, which continued for the two following days. At the end of this time he entered the hospital in the following state:—trismus, the head drawn backwards and forcibly retained in this position by the muscles which are inserted in the occipital region; rigidity of all the extremities; abdomen hard as a board; the intellect perfect; notwithstanding the trismus, the patient could articulate with suffi-

cient distinctness to give the above account of his case. *From the time when the first tetanic symptoms appeared, the vomiting and epigastric pain ceased*. He died on the evening of his admission. On dissection, no appreciable alteration was found in the brain or spinal marrow; the meninges of the brain were very slightly vascular, but those of the spinal marrow pale. The whole surface of the stomach presented an intense red colour, which was at first concealed by a thick layer of mucosities. The remainder of the digestive tube was perfectly healthy, and the thoracic organs were natural.

There can be no doubt that the condition of the stomach in this case was the result of an intense inflammation, as no other cause for vascularity existed, such as a mechanical obstruction to the circulation. The healthy state of the remainder of the tube, and the accordance between the first symptoms and the condition of the stomach are also of importance with respect to this conclusion.

A patient, aged 30, addicted to the use of spirits, was admitted into the Meath Hospital in March 1832, labouring under violent maniacal excitement; the eyes bloodshot, and the aspect ferocious. He had thirst, a dry and shrivelled tongue, but the belly did not seem tender; the pulse was quick and weak, the bowels were constipated. No accurate history of his previous state could be obtained. The cerebral symptoms increased so as to require the use of the strait-waistcoat, and continued with violence until a short time before death, which occurred on the eighth day after his admission. On the third day the belly was slightly tender, and somewhat tympanitic, and we applied a blister, but without relief. Opium and the cold affusion failed to relieve the cerebral symptoms. On dissection, no appearance of inflammation was found in the brain or its membranes. Some serous effusion existed in the cavity of the arachnoid, but none in the ventricles. The splenic extremity of the stomach was marked with patches of dotted redness, and the mucous membrane softened. The lower half of the ileum, the cæcum, and part of the ascending colon presented marks of intense inflammation, and were studded with numerous ulcerations, some of which, at the termination of the ileum, were of great extent.

We may enumerate the nervous symptoms in gastritis as follows:—prostration, subsultus, coma, all the shades of delirium, headach, intolerance of light, exaltation of muscular force, convulsions, tetanic spasm.

A sympathetic cough, sometimes of great severity, may occur as a consequence of acute gastritis; and, as is the case with respect to the brain, actual disease of the lung may result if the irritation be severe or long-continued, or if the patient have a predisposition to pulmonary disease.

In the *Histoire des Phlegmasies Chroniques* a number of these cases are detailed. In some the disease simulated inflammatory catarrh, and in one pneumonia. The principal symptom was a violent cough, often occurring at each inspiration, and more severe during the exacer-

* Clinique Médicale—Malad. de l'Abdomen, Obs. xxxix.

bations of the fever. In no case did those violent paroxysms occur which, as in pertussis, produce swelling and lividity of the face; but in all this severe cough, "à secousses," continued during the disease, and was sometimes accompanied by a tearing pain. As might be expected, hæmoptysis and many forms of bronchial secretion may be produced—an indication, to use the words of Andral, that the lesion of innervation has been followed by that of circulation and secretion. But notwithstanding these symptoms, so likely to mislead, we have, thanks to the advanced state of medicine, two sources by which a true diagnosis may be arrived at. One of these is the fact, that these pectoral symptoms are more relieved by the treatment of gastritis than by that of inflammation of the lung; more relieved by cold drinks and leeches to the epigastrium than by the use of the lancet. This, any practitioner who has the charge of an hospital will have opportunities of verifying. The second is derived from the use of percussion and the stethoscope, by which, as has been before stated, we find one of two things, either that there is no disease in the lung to account for the violent cough; or, if there be disease discoverable, it is not of sufficient extent or intensity to account for the symptoms.

Under such circumstances, particularly if fever exists, and there is no laryngeal disease, the source of the cough is to be sought for in the digestive system. This sympathetic cough has been long noticed as arising in cases of abdominal irritation, such as worms; but in these countries its supervention in acute gastro-enteric inflammation has not been sufficiently studied. The modification of the principal symptoms of gastritis in this case would greatly increase the liability to error; and the common practice of exhibiting tartar emetic in pulmonary inflammation would, under such circumstances, be followed by the worst results. We have little doubt that, had Laennec lived much longer, he would have altered his opinion as to the safety of this remedy in cases of pulmonary combined with gastric disease; as a very extensive experience has convinced us that even a slight shade of gastro-enteritis is sufficient to contra-indicate the use of tartar emetic in cases of pulmonary disease. In such cases its specific action fails, and the abdominal inflammation is sure to be increased.

Acute gastritis may be accompanied by various forms of fever, so as to represent the inflammatory, ataxic, or adynamic species. Most generally, however, the fever is of one of the two latter types; and it too often happens that the existence of the adynamic symptoms leads to the most erroneous and fatal practice. In the prostration of strength, the petechial eruption, and other analogous symptoms, the symptomatic physician sees nothing but direct debility. The disease is to him a *typhous fever*, and the gastric inflammation is exasperated by stimulation, which adds to the debility by increasing its cause. An extensive knowledge of the state of the science on this subject, a sufficient experience, and a most accurate investigation of the early symptoms, are all necessary

for determining the question. Often has it happened to us to see patients to whom stimulants had been administered with an unsparring hand, notwithstanding a progressive prostration (a circumstance that should have led to a suspicion of the state of parts,) whose life was distinctly saved by the inhibition of all stimulants, the use of ice, and the application of leeches to the epigastrium.

The fever also may be remittent or intermittent. In a case recorded by M^r. Annesley, in which death took place in seven days, the symptoms were constant vomiting and hiccup, with a tertian fever. The patient did not complain of pain. On dissection, the stomach was found studded with small ulcers.

Before proceeding to the consideration of other forms of gastritis in the adult, we shall examine the acute form of the disease, as occurring in infants. Like enteritis, inflammation of the stomach may be an intra-uterine disease, a fact established by the researches of Billard. But we must avoid confounding a congested state of the mucous membrane with inflammation, and this is the more important as congestion of the stomach is common in new-born children, particularly in those who have died by asphyxia. There is, however, decided evidence that gastritis may occur during fetal life. We shall on this subject abridge two cases from the work of the author just named.

A new-born male child died on the evening of his exposure at the Foundling Hospital of Paris, the symptoms being severe crying, almost permanent contraction of the features, and some vomiting of brownish matter. On dissection, the great extremity of the stomach was found eroded by numerous irregularly-rounded ulcerations, which evidently resulted from the destruction of the mucous follicles, as some of these were found but partly ulcerated. The bases of these ulcers were of a bright yellow colour, and the edges, slightly tumefied, were vividly red, so as to form a striking contrast with the rest of the mucous membrane. In this case the author conceives that the development of the gastritis must have been recent, as there was no emaciation, and the disease did not seem to have arrested the progress of the fetal evolution. Billard has frequently seen this disorganization in children who have died shortly after birth, and in whom there was also no emaciation. From these circumstances he is led to believe that when the follicular ulceration of the stomach occurs as an intra-uterine disease, it is most commonly developed during the last days of fetal life.

In the next case the disease was more chronic. A female infant was deposited at the hospital in a pale, emaciated, and feeble state. The exhaustion increasing daily, she was sent to the infirmary six days after birth. On admission, the lower extremities were oedematous and hard, the body pale, the mouth dry, the skin arid and hot, and the pulse very small; there were also bilious diarrhœa, and the signs of hepatisation of the left lung. Death took place in nine days, being preceded for two days by abundant vomiting, which followed the cessa-

tion of the diarrhœa. On dissection the œsophagus was found intensely red and tumefied. The mucous membrane of the stomach was generally white, but in the lower portion of the pyloric third a deep round ulcer, with elevated edges, of a reddish brown colour, was found; this was not surrounded by any inflammatory tumefaction; its base was of a dark colour, and formed by the serous membrane alone. In this case the death is attributable to the pneumonia and œsophagitis, and probably the debility and emaciation to the ulcer of the stomach.

But gastritis is not unfrequent in infants as a disease occurring after birth. It is most commonly complicated with enteritis. Thus, out of one hundred and fifty cases of inflammation of the digestive tube, observed in the Foundling Hospital of Paris, there were ninety cases of gastro-enteritis, fifty of enteritis without gastritis, and only ten of gastritis without enteritis. Four varieties of gastric inflammation have been described as occurring in infants, and the following is Billard's arrangement of these forms of disease:

1. Erythematous gastritis.
2. Gastritis with alteration of secretion.
3. Follicular gastritis.
4. Gastritis with disorganization of tissue.

By the first is implied an inflammation of the mucous membrane, of which vascularity is the principal character; the second is a state of the stomach identical with that of the mouth in the disease called *thrush* in these countries; the third is analogous to the dothino-enteritis of Bretonneau, consisting of an inflammation and ulceration of the mucous follicles; and the fourth comprises gangrene, and the peculiar disease described by Cruveilhier and Guersent under the name of the gelatinous softening of the stomach.

We must not, however, suppose that these forms of disease are essentially different affections. They are all examples of inflammation, varying in degree, in seat, and in result, according to the violence of the disease and constitution of the patient; they may succeed one another, or even occur together, as was the case in the thirty-fourth case of the above author, where erythematous redness, the peculiar alteration of secretion, the follicular ulceration, and the gelatinous softening occurred together. The existence of the second variety has been doubted, but is established by the researches of Billard; it is certainly rare, and was consecutive to the disease in the mouth.

There is but little to be added with respect to diagnosis to what has been already laid down. Vomiting, tension and pain of the epigastrium; painful cries when this region is pressed, and alteration of the countenance, are the principal signs of gastritis in the new-born infant. Should such symptoms arise when the mouth is affected with thrush, it becomes probable that the disease has extended along the œsophagus to the stomach; vomiting of a dark and sanguinolent matter has been observed in the follicular species; but in one respect the

gastritis of very young infants differs from that of the adult, namely, in the almost total absence of febrile reaction.

In the article DENTITION will be found Cruveilhier and Guersent's descriptions of the *gelatinous softening* of the stomach, with the symptoms as observed by them. To this we beg to refer, but in order to embody as much information on this interesting subject as possible, we shall introduce the description as given by Billard.

"The disease generally commences with symptoms of a violent gastritis, such as tension of the epigastrium, which is painful to the touch; vomitings, not only of milk and drinks, but also of a green and yellowish matter, which come on every moment without regard to the time when the child has taken food or drink. There is sometimes diarrhœa, varying in different subjects, and returning after having ceased for a day or two; the matters discharged being often green, like those from the vomiting. The extremities are cold; the pulse is generally irregular, but seldom presenting a constant character; the countenance expresses pain constantly, the face remaining furrowed as if the infant were crying; the cry is expressive of pain, the respiration interrupted, and the general agitation so great that the existence of a cerebral affection might be suspected. To these symptoms succeeds a state of prostration and insensibility from which the child is occasionally roused by pain, when the agitation observed at the early periods of the attack reappears. At length, at the end of six, eight, or fifteen days, and sometimes even much later, the patient sinks exhausted by want of sleep, constant vomiting and pain: in very young infants there is little or no fever."

The result of this disease is the reduction of the mucous membrane to a gelatinous pulp, and such a thinning and softening of the parietes of the stomach that the slightest force will produce a rent. According to Baron and Billard this condition of the stomach is most evident in the greater curvature. In the adult a very analogous affection is observed, to which we shall presently allude.

II. *Chronic gastritis*.—Since the improvement in our knowledge of pathological anatomy, this disease has been found to be much more frequent than was formerly supposed; and numerous instances of what had been believed to be merely dyspepsia, are now proved to be in reality examples of chronic inflammation. Here is one great instance of the improvement in medicine by means of pathology; and in the treatment of these diseases, the tonic and stimulating plan must speedily yield to the judicious employment of the antiphlogistic mode, and a physiological be substituted for an empirical treatment. But we are far from going to the full length of the doctrines of Broussais on this subject. There are too many instances of functional disease of the stomach on record to allow us to doubt that there may be dyspepsia without gastric inflammation; in fact a lesion of innervation without inflammatory action is a

condition common to the viscera, and it would be strange if the stomach formed an exception. It is certain that cases of dyspepsia will mend under a treatment not calculated to remove inflammation; but it is also undeniable that a great number of dyspeptic and hypochondriacal cases, so far from being benefited, are made worse by such a proceeding. The failure of one stimulant or tonic remedy is followed by the trial of another, until the patient sinks; and, on dissection, various results of chronic inflammation are found in the upper portion of the digestive tube. The error of confounding these diseases is one easily fallen into, as in many cases the symptoms are the same, and the fact of chronic gastritis being frequently an appyrexial disease contributes to perpetuate the error. When we consider that in most cases the exciting cause of dyspepsia is an over-stimulation of the stomach, and recollect the law in pathology, that functional seldom continues long without inducing organic disease, we cannot help believing that in most cases of chronic dyspepsia there is more or less of gastric inflammation. Whether this has been the primary affection, or has succeeded to the functional disease, is of comparatively little importance, as its existence is the great point on which turns the success of our treatment. We can assert with confidence, that in numerous cases of chronic dyspepsia, where the fullest trial had been given to the whole class of *stomachic* remedies without relief, the disease has yielded to a strict regimen, with local bleeding and counter-irritation on the epigastrium. Andral, in his *Précis d'Anatomie Pathologique*, declares that, of all the forms of dyspepsia, that from irritation of the stomach is by far the most frequent.—(See the article INDIGESTION.)

In the present state of the science we cannot fix on any symptom sufficient to distinguish chronic gastritis from functional derangement. Painful digestion, loss of appetite, irregular appetite, flatus, eructations, acidity, pyrosis, vomiting, unhealthy states of the tongue, with other symptoms, are common to both; but if the disease be chronic, and if it has resisted the tonic and stimulating plan, the probability of its being a gastritis is almost converted into a certainty. It is scarcely necessary to add, that in the diagnosis the relative frequency of the two affections is never to be forgotten. This point will be fully considered in the article just referred to.

Chronic gastritis occurs with a great variety of symptoms. It most commonly commences in a very insidious manner, and may continue for a length of time without much injury to the general health, and may even coincide, according to some authors, with an increase of nutrition. At this period the disease is too often exasperated by the use of the common anti-dyspeptic medicines; the habits of the patient remain unaltered; and it is not until the symptoms become severe that the disease is suspected. Of these the most frequent appear to be pain and vomiting. The first is commonly felt during the process of di-

gestion, when it is generally severe, and in some cases intolerable; but it subsides either altogether or in a great degree when the stomach becomes empty. The seat of this pain is various, but is generally in the epigastrium or hypochondria, and it may extend to the back. In some cases it is described as being lancinating, in others dull, and may be accompanied by a feeling of constriction and globus, as in the more acute forms of the disease. The epigastrium and left hypochondrium are generally tender, and, when the disease is established, often present a remarkable fulness and resistance to pressure. Vomiting is the next most frequent symptom. In some cases the ingesta alone are rejected, and the vomiting occurs sooner in proportion to the quantity and stimulating nature of the food; but in some severe cases the most unirritating substances are speedily rejected. Great relief often follows the vomiting, and the patient continues comparatively well until he next attempts to take food. Even when the stomach does not contain food, vomiting may occur; and we have known an instance where the patient had acquired the habit of vomiting at will, so as to relieve himself from painful sensations. When vomiting does not occur, the sufferings of the patient are often great. In some instances the process of digestion goes on well, until, as the patient describes it from his feelings, the food arrives at a particular part of the stomach, when pain is induced and the food speedily rejected. This appears more common when the disease is severe but circumscribed.

There is a great variety in the matter ejected. Sometimes there is nothing but an insipid watery fluid; in other cases it is like the white of eggs; it may be intensely acid and acrid; dark-coloured, bilious, or bloody. In one case we have seen a fluid of a blue colour ejected in considerable quantity. Hematemesis is a common attendant on this disease; in some cases proceeding from an exhalation, in others from ulceration of large trunks, as described by Prost; but independent of the latter case, many instances of hematemesis are closely allied to gastritis,—a point of the utmost importance in treatment. Gastritis may commence by hematemesis; will often follow on its suppression, and the treatment of gastric inflammation is that which will most frequently succeed in removing the symptom. The analogy of active hemorrhage in other situations strongly corroborates these views. (See HEMATEMESIS.)

As the disease advances, other symptoms present themselves. In the most severe cases there is complete loss of appetite; but in the less violent this is not observed. The appetite may be capricious, as in pica; and in some instances the taking of food gives temporary relief to a gnawing sensation in the epigastrium. Bulimia has been described as a consequence of this disease, but further researches appear necessary on this subject; and it is probable that the more remarkable

cases of this affection have depended on causes very different from gastric inflammation. Anorexia, however, is one of the most constant attendants on the disease, and many lesions of the stomach may exist without causing any other symptom than a complete loss of appetite.

An exceedingly frequent symptom in chronic gastritis is a constipated state of the bowels; and relief to a certain degree follows the action of purgative medicine. From this circumstance the patient often attributes his sufferings to the constipation; and the same view is too frequently taken by his attendant. What is an effect is considered as a cause, and purgatives are looked to as a means of cure; the disease is allowed to run on until it has passed the reach of art, aggravated no doubt not only by the want of antiphlogistic treatment, but by the acrid substances themselves, which are poured in increasing quantities into the suffering organ. We shall revert to this in considering the treatment of the disease in the advanced stages.

The appearance of the patient is generally characteristic. There is great emaciation, with a countenance expressive of distress, sallow, and with dusky patches on the malar eminences. The skin has a semi-jaundiced appearance, and is at times tightly drawn over the emaciated muscles, so as to resemble that state in horses called *hide-bound*. The tongue presents various appearances, and in this, as in the acute disease, can seldom be considered as indicative of the condition of the stomach. As might be expected, the sympathetic irritations are by no means so well marked as in acute gastritis; but they may all occur. In some cases fever, generally of a remittent character, has been observed.

The disease terminates variously. In some cases death occurs apparently by exhaustion; in others by peritoneal inflammation, induced by a perforating ulcer of the stomach; but its most frequent termination is by extension of disease to other parts of the digestive system, which are generally the duodenum, liver, and spleen: in this way dropsy may be the result of the disease. In other cases the ileum and colon become engaged, and the patients sink from diarrhoea. Fatal vomiting of blood has sometimes occurred, apparently the result of the erosion of large vessels.

It is a remarkable fact that circumscribed gastritis may exist in a manner almost completely latent. Dr. Abercrombie gives a case where the symptoms had been merely those of slight dyspepsia, yet in which fatal perforation occurred from ulceration; and the same author gives, on the authority of Dr. Kellie, an instance of a young and healthy female who had never complained of any gastric symptom, when she was suddenly seized with violent peritonitis, which proved fatal in eighteen hours, and on dissection was found to be caused by a perforating ulcer in the lesser curvature, around which there existed unequivocal marks of extensive and chronic

disease. The patient had resided for four months in the house in which she died, and was never known to have complained of her stomach. Some months previously she had laboured under fever.

It is not uncommon to meet with these circumscribed ulcerations in the dissections of persons who have died of other diseases. Under these circumstances, they are generally either altogether or partly cicatrized, presenting rounded and thickened edges, which are seldom vascular. The base of these ulcers often consists of the serous membrane which has formed adhesions with the liver, pancreas, spleen, or colon. In our dissections at the Meath Hospital we have seen many examples of these. A most remarkable case of communication between the stomach and colon is detailed in the work just quoted. The patient had complained of slight dyspeptic symptoms for some time, when his appetite became impaired; he had some loss of flesh and occasional pain in the abdomen. These symptoms continued for two or three weeks, when he was suddenly seized with fecal vomiting. He felt no further inconvenience for a week afterwards, when he was again attacked in the same manner. This symptom returned frequently for three months, when death took place. On dissection, nearly the whole of the great curvature of the stomach was found ulcerated; in its centre an opening of two inches in diameter, communicating with the arch of the colon, was observed.

As the pathological anatomy of the stomach differs in no respect from that of the intestines, we shall refrain from entering into a description of it here, the subject having been already discussed in the article ENTERITIS, to which we beg to refer. The attention of pathologists has been of late directed to an affection of the stomach in which there is a remarkable softening of its coats. To this we have alluded in describing the gastritis of infants. In the adult it is not unfrequently met with; but though in some cases it is to be referred to a process of inflammation, yet it will often occur under different circumstances. We beg to refer to the writings of Cruveilhier, Louis, and Andral on this subject, and merely remark here, that in the inflammatory species redness generally accompanies the softened state of the tissues.

One of the most interesting and instructive circumstances connected with the history of chronic gastritis is the supervention of acute attacks on the chronic affection. This is often brought about by the use of a too stimulating regimen, but more frequently by the injudicious exhibition of tonic, stimulating, and purgative medicines. It is generally pointed out by the occurrence of fever: the tongue is altered, and the thirst becomes urgent. In other cases which we have observed, there has been no fever, but the appetite has altogether failed, the pain has increased, and the prostration of strength has become alarming. In some cases hemorrhage may take place, which

is followed by great alleviation of all the symptoms.

An interesting example of this aggravation of symptoms occurred to the writer during the last year. The patient was a woman aged 50, who had laboured for nearly a year under the symptoms of scirrhus of the pylorus. In three months after her first illness, a tumour appeared, which, when first seen by the writer, was extensively moveable, occupying the median line, but evidently passing under the left ribs. This had formed adhesions with the abdominal parietes, and in its centre existed an ulcerated opening, through which any fluid taken into the stomach was instantly projected in a small jet. The fistula was closed by a compress and roller; and as the patient seemed almost in articulo mortis, some wine and animal food were allowed. This was followed by burning pain in the stomach, great thirst, heat of skin, a quick and wiry pulse, red and dry tongue, and some delirium. On removing the compress, it was found *that the fluid ingesta did not pass through as formerly*. In the course of three days these symptoms subsided, when the fluids again passed through the fistula: soon after she sunk. No dissection was obtained.

This case is fully reported by the writer's friend and pupil, Mr. William Hamilton, in the *Lancet* of January 28, 1832. He remarks that a fistula thus formed may be closed by inflammation for a time, and hence by analogy it may be concluded that where the intestine is nearly obstructed, it also may become entirely closed by inflammation, and prevent the passage of food; but that, on the subsidence of this inflammation, the passage may be restored.

We shall now briefly examine the question as to whether cancer of the stomach and chronic gastritis are to be considered as identical. In this investigation all the difficulties arise which result from our imperfect knowledge of cancer in general. Supposing that cancer is a new product, and not a mere alteration or transformation of tissue, the question resolves itself into two points:—*first*, does irritation or inflammation, taken in their ordinary acceptance, induce a development of this new matter in the tissues of the stomach? and, *secondly*, may the cancerous matter be deposited independently of any primary irritation, in consequence of a diathesis or disposition of the system at large? In the investigation of the first point we may be assisted by analogy; as for instance, in the case of pulmonary tubercle. That irritation and consequent inflammation does induce this disease in many cases there can be no doubt. How many cases of phthisis commence by a bronchitis; and in what a number of instances are the first symptoms of cancer of the stomach those of a gastritis. In many cases the exciting causes of phthisis are those which would produce inflammation; and the same may be remarked in the case of cancer of the stomach. External cancer is often induced by an injury;

and blows on the epigastrium are enumerated among the causes of the internal disease. Why it is that in one case inflammation will induce cancer, and another not, we cannot explain, any more than why an injury in one person will cause hydatid, in another suppuration, or in a third hypertrophy; or the same morbid influence induce in one continued fever, in another dysentery, and in a third ague.

M. Prus, in his late work on cancer of the stomach, endeavours to draw a distinction between the two diseases, founded more on the exciting causes than on the pathological characters or symptoms of these affections. On this subject he says, "We admit that it is impossible in the actual state of the science to distinguish the organic alterations which constitute a cancer of the stomach from those which are owing to a chronic gastritis."* He also admits that it is impossible to find any distinguishing symptoms between the two diseases, and the indications of treatment which he gives for cancer are essentially those of gastritis; but yet, from the following circumstances, he believes that they are different diseases. He compares the exciting causes of the two affections; but if we abstract those of acute gastritis which he has unfairly thrown into the table, we find that they are essentially the same. Those of gastritis are as follow:—suppression of a sanguineous discharge; excess at table; contusions on the epigastrium; repression of gout, rheumatism, or an exanthem; violent passion. Those of cancer are:—depressing passions; abuse of spirituous liquors; excess in venery; contusions of the epigastrium; suppression of a sanguineous discharge. We submit, therefore, that the exciting causes, as given by this author, are almost completely the same, and that they do not warrant his conclusion, that while those of gastritis act by inducing a sanguineous congestion of the stomach, those of cancer act primarily on the nervous system.

M. Prus lays great stress on the occurrence of pain as an almost constant symptom in cancer. Admitting that it was so, it would form no distinction; but the fact is, that it is by no means so constant an occurrence. On this foundation, and on the relief afforded by opiates, he builds his theory that cancer is a result of a neurosis of the stomach, which he calls "*cancerous irritation*," which is not inflammatory, which is not neuralgic, and differs from a neurosis in this slight particular, that it is followed by lesions of secretion and nutrition! This is merely playing on words.

In the present state of the science we must admit that inflammation may induce that state of the stomach called cancer; and there can be no doubt that when the disease is established, there is always more or less of inflammatory action—a fact of great practical importance, no matter whether the inflammation be primary or secondary. But if cancerous matter, like tubercle, be deposited in other situations, without the necessity of previous inflammation, there

* P. 130.

is no reason why the same should not occasionally occur in the stomach.

Treatment.—The indications of treatment in gastritis generally appear to be as follows:—1. to relieve the inflammation as speedily as possible, so as to prevent disorganization; 2. to avoid every thing that can excite or stimulate the stomach; 3. to moderate the sympathetic affections.

Authors are divided in their opinions as to whether general bleeding be proper in acute gastritis. But if the disease be in an early stage, the patient robust, and the pulse resisting, bleeding may always be had recourse to with advantage,—more, however, as a preparative for leeching than as a direct relief of the inflammation. The previous state of health of the patient must also be considered, as the stronger this has been, the greater will be the benefit from general bleeding. In a weak subject, or in a case where an acute attack supervenes on a chronic gastritis, general bleeding is almost inadmissible.

The great remedy is the application of leeches to the epigastrium, which should be done freely and repeatedly until decided relief is obtained. There are few things more striking in the practice of medicine than the effect of this proceeding in a case of acute gastritis: the vomiting, the burning heat, are often relieved as by a charm; but we have often seen violent cough and delirium subside under the same circumstances. The number of leeches must, of course, be adjusted by the age and strength of the patient, but in this disease injury is more often done from the want than from the excess of leeches. In general, however, gastritis does not require so many leeches as the acute peritonitis. In a robust adult, and where the symptoms are violent, from twenty to forty may be safely applied. In children the number must be regulated by the age. In robust infants four or six may often be applied with safety and benefit. After the leeches fall off, it is better, where it can be done, to apply a cupping-glass, by which more blood is obtained, and the oozing of the leech-bites often prevented, for it is preferable to apply leeches again than to allow the same quantity of blood to be lost by oozing. This rule is peculiarly true in the case of children, in whom it is right to arrest the hemorrhage as speedily as possible. From these circumstances a poultice should not be applied over the leech-bites in infants, or in adults of a feeble constitution; but in different subjects where the fever is high and pulse strong, this may be found serviceable, where its weight does not distress the patient. The best material for a poultice is linseed meal; and as it must be made thin and light, it will require to be changed every three hours. When its weight and heat excites distress, it will certainly do more harm than good, as the practice is then opposed to the instinctive wish of the patient for cold to the part, which has led to the application of ice to the epigastrium in cases of violent gastritis,—a practice which is rational, supported by analogy, and recommended by high authority. In these countries,

however, it has not yet received a sufficient trial.

The bowels, which are commonly confined, are to be relieved by enemata; but on no account is purgative medicine to be given by the mouth. In using injections, it is better to employ those which are not stimulating, though gently laxative; and it is always right to employ the long gum elastic tube, which will seldom fail in giving great relief.

The patient should inhabit a cool airy room, and be removed from all excitement. Cold drinks, such as pure water, iced water, iced lemonade, may be given ad libitum, and in many cases we have given solid ice in considerable quantity and with decided benefit. The older authors recommended that the drinks in this disease should not be cold, from an apprehension that, as cold drinks sometimes excite inflammation, they would be injurious during its existence; but this reasoning is obviously fallacious. Strict watch must be kept to prevent the attendants giving any thing in the shape of a stimulant, whether as food or drink; it is to be recollected that what is innocuous in health may become under these circumstances a deadly poison; for the sensibility of the stomach is so exalted, that the blandest articles will occasionally produce a fatal relapse.

This should be the general outline for the treatment of all cases of acute gastritis. Let the practitioner recollect that all the symptoms proceed from an inflamed state of the stomach, and consequent excitation of its sensibility and sympathies, and avoid the practice of prescribing a medicine for every symptom. Let him combine all his efforts to subdue this inflammation, and do nothing which can possibly interfere with this indication.

Effervescing draughts are commonly used in cases of irritability of the stomach, but in gastritis they often fail altogether in relieving the vomiting; and when this is the case, there is little doubt but that they exasperate the disease. Even when they remain on the stomach, it does not follow that they are beneficial; in several cases they do injury, partly by their direct stimulation, and partly by the mechanical distention of the stomach. They may be used, though with caution, in cases of mild gastro-enteritis, where the disease predominates in the lower portion of the intestine.

In the early stages of the disease, and always where leeches have not been applied, blisters are improper, particularly when applied on the abdomen; in those cases, however, where the disease has followed the retrocession of an exanthem, they are perhaps more admissible. If they are used in the ordinary gastritis, it should be in the advanced stage, and never allowed to remain after pain is excited.*

The use of emetics has been resorted to in the early stages of this disease, but is a practice full of danger. P. Frank declares that an emetic is in general fatal in gastritis; but this perhaps is going too far. In some of the very mild shades of the disease, an emetic may be

* See the article DERIVATION.

attended with advantage, and is also useful and indeed necessary when the disease has resulted from an excess at table, and supervened while the stomach was loaded with undigested food. But as a general treatment we are decidedly opposed to the emetic plan, particularly to the use of antimonials, which are peculiarly injurious when any degree of gastritis exists. The remarks made on the use of purgatives in enteritis* apply nearly to that of emetics in gastritis.

After the violence of the attack is over, and the patient convalescent, the greatest attention is to be paid for a length of time to his regimen. This is of all cases that in which an error in diet is most to be feared; as an excited sensibility of the stomach remains after the inflammation has subsided. Farinaceous substances, with the mildest broth and vegetables, should constitute the patient's food for a considerable period; and if any fixed pain should continue in the region of the stomach, even though the general health and appearance of the patient be improved, the efforts to remove this should be incessant, as it most frequently depends on a circumscribed inflammation, which, if not relieved, may terminate in an incurable ulceration. The means best calculated to remove this symptom are a strict regulation of the regimen, and counter-irritation on the epigastrium.

Facts are still wanting to establish the efficacy of mercury and opium in this disease. From what we know of the stimulating effects of calomel on the gastro-intestinal surface, it seems probable that its use in gastritis would be often injurious, or at least hazardous. It has been said that large doses of calomel have succeeded in arresting obstinate vomiting; but the cessation of a single symptom by no means implies the removal of the disease, or even its alleviation. If ptyalism were speedily induced, we have reason to believe that the result would be favourable; but all practical men know that in a severe inflammation this is a matter of great difficulty or even impossibility, and the chance of our succeeding in the attempt does not warrant any measure that may compromise the safety of the patient. If mercury be used, it should be by inunction.

The treatment of chronic gastritis is founded of course on the same general principles as that of the acute species. It may be considered under two heads—the *curative* and the *palliative* treatment; the first to be adopted in cases where there is a chance of cure; the second where the disease has passed the reach of art. We believe that, if there is a disease more frequently mistaken and maltreated than another, it is chronic gastritis. The general practice in this disease is really the opprobrium of medicine, as in the great majority of cases it is not recognized, but considered as a mere functional affection. It is called dyspepsia, hypochondriasis, liver disease, torpor of the biliary organs, constipation, any thing but its proper name. The effect of all this is, that almost every attempt at cure in reality exasperates the disease. Bit-

ters, tonics, aromatics, antacids, acids, nervous medicines, iron, arsenic, bismuth, mercury, and purgatives are given in turn; and who can wonder if cancerous ulceration or incurable disease of the solid viscera be the result of such a treatment?

In chronic gastritis the cure is principally to be effected by a long attention to the diet of the patient, which should be as sparing as his strength will allow, and consist of the least possible exciting articles of food. By this simple and physiological mode, by which nature is allowed to exercise her full powers, cures have been performed in cases where great emaciation had occurred, and where the skin had assumed the peculiar hue so characteristic of abdominal disease. Such a result, however, can be rarely hoped for under such circumstances.

We have succeeded in many cases by this mode, and by the repeated application of small numbers of leeches on the epigastrium. The bowels were kept open by injections, and no medicine whatever given by the mouth. In addition to these means, a blister and frictions with the tartar emetic ointment were employed with decided benefit. In the treatment of this disease we are encouraged to persist in these means from the knowledge that ulcers of the stomach may become cicatrized, and a permanent cure be thus produced. The case of the celebrated Beclard is an interesting example of the effect of a physiological treatment. He was attacked with symptoms of gastritis, which after some time assumed the chronic type. He had then frequent pain, and vomited most of his food; he restricted himself to a severe regimen; occasionally applied leeches, and used the tartar emetic ointment. For a length of time no permanent relief was obtained, but he persisted in this treatment, which ultimately proved successful. After his death, which occurred from a disease of the brain, a cicatrized ulcer was found in the smaller curvature of the stomach; its edges were neither red nor tumefied. The rest of the stomach was healthy.

But are we to believe that tonics should never be employed? Facts are wanting to clear up this question; yet, if we reason from analogy, we should admit that after the disease has been modified by a proper antiphlogistic treatment, such remedies might be applicable. There is at least one case where they seem useful; where, after the prominent signs of disease have been removed, the powers of the stomach do not regain their former strength; but even in this case they are to be used with caution. The great source of injury is the practice of prescribing for symptoms, without connecting these with the pathological state of the viscus; a practice which must always prevail so long as pathology is not more extensively cultivated.

The palliative treatment consists essentially in avoiding over-stimulation, and in the use of the narcotic remedies. Many cases are on record where these have given great relief for a length of time. Those which we have known to answer best are the hydrocyanic acid, and the acetate of morphia. For instances of the effi-

* See the article ENTERITIS.

cacy of the narcotic remedies in chronic stomach affections, we would refer in particular to Dr. Bardsley's late work.

In these incurable cases the distressing symptoms of flatus, acidity, &c. must be met by palliatives, as we cannot hope to remove their cause. We beg to refer to the articles INDIGESTION and CANCER OF THE STOMACH for information on these points.

(William Stokes.)

GASTRODYNIA, from *γαστήρ*, ventriculus, the stomach, and *δύνη*, dolor, pain.

Pain of stomach occurs as a symptom of several diseases. It is often expressed by the term *gastralgia*, but this seems to be used rather in a general sense to denote mere pain of stomach, from whatever cause arising, than as designating any specific malady. Indeed, to comprise under one general head all pains which affect the stomach would bring together morbid conditions so heterogeneous, or at least so remotely allied, that no advantage could accrue either to nosology or practice from such a combination. Many pains are but symptoms of other diseases, in connexion with which they are most appropriately and beneficially discussed. In the present article it is not proposed to treat of all pains of stomach, but principally of one form of such complaint which has long been regarded as an individual disease, and has had a specific character assigned to it in nosological systems, under the denomination prefixed to the present article.

There is a convenience, especially for recording and communicating practical knowledge, in assigning a certain individuality to diseases, designated by brief and comprehensive terms, and so far nosology has its use. But there are also evils attendant on such arrangements which should be kept steadily in view, else they are very liable to mislead, and to divert attention from the only source of real knowledge, the examination of those morbid actions and structural lesions which constitute diseases, and by the minute scrutiny of which alone can we ever acquire just notions of their nature or treatment. A name is not altogether unimportant, for if not founded on the essential derangement, but derived from a contingent symptom, it conveys a false notion, which, to the young and inexperienced at least, is not harmless, tending to contract their views at that period of life when the spirit of inquiry is most active, and very likely to give a bias to their maturer judgment. Early impressions sink deep; early experience being directed by them is apt to confirm them; the active business of life does not always afford time or opportunity for investigating or correcting fundamental misconceptions; and thus a prejudice, engendered by a mere name at the commencement of professional life, may endure to its close. The history of physic affords abundant evidence how tardily early prejudices and misconceptions yield to the force even of demonstrative proof; of which the reception which Harvey's discoveries met from his contemporaries may be adduced in illustration.

Pain of stomach is not properly a disease, but a symptom attending diseases which have their seat in the stomach, or which sympathetically affect it. The evil of regarding the pain as identical with the disease, is that, on this presumption, whatever has the power of allaying the pain must be deemed the appropriate remedy for the disease, an error which has given rise to much mischief, and which more extended investigation of the real nature of the disease fully exposes.

Nevertheless, in the present state of our knowledge, we must follow the denominations of diseases generally received, and no injury need result so long as the name is not suffered to decide the pathological character, nor to repress inquiry into those morbid actions or conditions to which remedies, to be effectual, must be directed.

The pain of stomach, which is the main subject of the present article, is generally regarded as a mere symptom of dyspepsia. Its great prevalence, however, the suffering which it causes, the interruption of healthy function which it indicates, its long durations, and the structural derangements that may ensue from erroneous or inefficient treatment, entitle it to a separate and independent consideration.

In Cullen's nosology gastrodynia has no place, save as a symptom of dyspepsia. Sauvages and Sagar, who regarded it as a distinct and specific malady, have each distinguished it by a definition; that of Sauvage as "*quicunque dolor notabilis et constans in regione ventriculi, qui continua animi dejectione non stipatur ut cardialgia, nec pyrexia ut gastritis.*" Sagar's, though more brief, is similar; "*notabilis et durans in regione ventriculi dolor, sine syncope et pyrexia.*"

Persons affected with this malady evince generally more or less of dyspeptic derangement. The sense of pain, however, overpowers every other feeling, and is represented as the sole complaint; the contingent ailments being acknowledged only on enquiry being pursued. So variable is the pain, both in intensity and duration, that it would be difficult to furnish a description which would comprise all its gradations. It is characterised as an obtuse pain, giving the sensation of the stomach being forcibly compressed. There is oftentimes tenderness on pressure at the ensiform cartilage, a sense of stricture across the lower part of the chest, with pain extending to the back, and impeding respiration; all marking the diaphragm to be implicated. In general the pain occurs more particularly at certain times of the day, lasts for some hours, and subsides. These attacks are more or less frequent, more or less durable. Sometimes the intervals of abatement are so inconsiderable that the pain is represented as lasting all day, although on enquiry the usual remissions will be found to have occurred. The disease is oftentimes met with unattended by any other indication of impaired health, the pulse being calm, the skin cool, and the tongue clean. Generally the tongue is more or less loaded; and in some a quick pulse and hot skin mark the co-exist-

ence of a febrile state. This last condition is not a frequent concomitant, and may be regarded as accidental, not being necessarily produced by or connected with the primary affection; yet it may have relation to the mucous membrane of the stomach passing into a state of inflammation, as will be hereafter noticed. The spasmodic character of the pain and the absence of fever have misled practitioners into much inefficient and injurious practice in this complaint. Stimulants, narcotics, and other antispasmodics have been freely given; yet notwithstanding the power which such remedies unquestionably possess of allaying the pain, there is good reason to believe that their use is not suitable for the cure of the disease,—nay, that, however they may temporarily alleviate, they, if solely relied on, tend in reality to confirm it, and render it more inveterate.

If the views of the malady about to be presented in this brief essay be correct,—and they are the result not of slight observation, but of extensive experience in this special disease, which prevails much among the poor,—the use of such remedies must be superseded by more rational and effective treatment.

The brief account already given of this disease is almost enough to characterise it. In the commencement the pain is generally slight and transient. Accompanied, as it frequently is, with flatulency, this is conceived the cause of pain; and as cordials and carminatives give relief, they are chiefly resorted to. Warm purgatives are apt to be employed; and as they both stimulate the stomach and evacuate it downwards, they are still more beneficial. Unless the disease, however, be very slight indeed, these remedies are inadequate to afford effectual relief. In time the attacks of pain recur more frequently, are more violent, and of longer duration. In this stage it is that opium, ether, and such remedies are resorted to; and as they have the power to lull the pain, their appropriateness is seldom questioned. On recurring attacks they are again employed, and with greater freedom; for the more such remedies are used, the larger must the doses be to produce the required effect. Thus recurring and thus treated, the disease leads in time to a variety of derangements, both visceral and nervous. Digestion becomes progressively more depraved, nutrition fails, and the body wastes; the strength declines, and the patient eventually sinks from exhausted constitution, if his fate be not hastened by some coincident or superinduced disease. Very different is the result when the early disease is treated on principles deduced from its real nature, and from that condition of stomach in which it originates.

So obviously spasmodic is the pain of gastrodynia, that, the real nature of the disease being unsuspected, it is not surprising that it should be regarded as essentially spasmodic, or that antispasmodic remedies should have been trusted to for its relief. The alleviation of pain, too, obtained by stimulants and narcotics was well calculated to confirm the pre-

vailing notions, and establish the practice founded on them as the most judicious that could be employed. Yet admitting the existence of spasm, it surely merited enquiry why this spasm should occur, and what causes could excite it. That the muscular coat of the stomach should be affected to this extent by any primary depravation of its own fibres was at least not probable, the supposition being inconsistent with the general state of health, which, in the outset at least of the disease, persons affected with gastrodynia ordinarily display. Some special irritation ought to have been suspected, and had this been sought in the condition of the mucous membrane of the stomach, and of its secretions, it could not long have eluded detection.

That in gastrodynia the mucous secretions of the stomach are redundant and unhealthy is sufficiently demonstrable. If emetics be given, this mucus is copiously discharged, of a quality to shew that it was not of recent formation. Instead of being fluid and pellucid, it is dense, membranous, and opaque, unlike in all respects to that which a healthy stomach discharges on the operation of an emetic. The difficulty, too, which the stomach experiences in detaching and expelling it is proportionally great, and the effort is oftentimes severe. The stools also are loaded with mucus, to which a corresponding state of the mucous membrane of the intestines no doubt contributes. The presence of this mucus evinces a previous excitement of the membrane secreting it, and in this irritation we may reasonably conceive the primary disease to exist. It is only, however, when the mucus thus formed accumulates and oppresses the stomach, that the spasmodic pain occurs; and when the foregoing facts are considered, in conjunction with the relief which suitable evacuants afford, it is difficult to resist the conclusion that the pain arises from a contractile effort of the stomach to detach and expel the offending matter. This view may be deemed conjectural, and in some respect it is so, resting for its truth rather on inference than demonstration; for as gastrodynia, at least in its earlier stages, does not destroy life, necroscopic observation, even if it could detect such morbid condition, cannot be referred to in proof of the lesions thus supposed. Yet it is a rational conjecture, and fully supported by all that we know both of the physiological nature of the parts concerned, of the phenomena of the disease, and of the effects of medical treatment. But we are not without direct evidences of the morbid condition of the mucous membrane here inferred, although they are not connected with the disease under consideration so as to make them available for directly illustrating it. All pathological anatomists who have investigated minutely the lesions of the gastro-intestinal mucous membrane, bear ample testimony both to the frequency of vascular congestion, and to the abundant mucus connected with it. In respect of the latter, Andral says, "on opening dead bodies one is sometimes struck with the prodigious quantity of mucus

on the internal surface of the stomach and intestines." Again he remarks, "we find vomiting produced by all possible degrees of irritation of the gastric mucous membrane, which cause the patient to throw up food and drink, or else the bile which had previously been attracted by the irritation of the stomach. In other cases the matter vomited consists of blood exuded by the irritated mucous membrane, or of mucus secreted in superabundant quantity, which last by accumulating becomes a kind of foreign body, and produces by its presence secondary irritation more considerable than that to which it owed its existence." The vascular congestion has been distinguished as existing in the capillaries, in the larger vessels leading to them, or in both. The hyperæmia of the capillaries is regarded as arising exclusively from irritation; and as these pervade the mucous follicles, and are in fact the source from whence mucus is secreted, there seems to be little difficulty in perceiving how irritation must almost of necessity beget an increased secretion of mucus.

If then, as appears, irritation occasions increased secretion of mucus, and if this mucus is capable of accumulating and of becoming a kind of foreign body, producing by its presence a secondary irritation more considerable than that to which it owed its existence, we have the elements of that pathology which long and patient observation of the effects of medical treatment has led us to assign to gastrodynia. What the precise affection is to which French practitioners give the name of "embarras gastrique" we are not aware, but many circumstances in the following extract from Andral shew that it is nearly allied to that morbid condition of stomach which prevails in gastrodynia, and of which spasmodic pain is only a contingent symptom.

"There is a peculiar morbid state of the stomach that has long been distinguished by French practitioners by the name of 'embarras gastrique,' the nature of which is far from being well known. It is characterised by a certain assemblage of symptoms local and general, does not yield at all to bloodletting, and but slowly to diet, while it readily gives way to emetics and purgatives. That the symptoms which attend this affection are often connected with irritation of the stomach, and that they are exasperated by tartar emetic, has been proved by experience; but that it is in every instance merely gastritis, and not a disease of another kind, and requiring a mode of treatment as peculiar as the symptoms that announce it, is a conclusion totally incompatible with observation. It may be presumed that one of the causes of the affection is an alteration of the mucous secretion of the stomach, and I do not see why such an alteration should be considered as necessarily the result of irritation, unless we choose to allow that the mucous coating which sometimes covers the tongue necessarily indicates glossitis." It is clear that the term irritation in the foregoing passage is used to express, not the simple irritation which merely excites increased secretion, but the

more active state into which this occasionally passes, and which, when advanced to inflammatory action, constitutes gastritis.

From the foregoing discussion it will, we think, be admitted that the researches of pathological anatomy are at least not opposed to that pathology of gastrodynia which assigns the spasmodic pain to the presence of offending mucus, and the efforts of the stomach to get rid of it. Irritation is no doubt the primary affection that leads to increased secretion of mucus, but it is to the secondary irritation caused by this mucus when redundant and accumulated, and to the efforts which the stomach thus exerted makes to throw off into its cavity what offends it, that the peculiar pain of gastrodynia must be referred. The spasmodic nature of these efforts accounts for the alleviation of pain produced by opium and stimulants, and the cause not being thus removed, we at once understand why such relief is but transient and ineffectual. The perfect relief desirable from suitable evacuates, without any aid whatever being required from narcotics, proves unequivocally how much more concerned the offending matter is in causing the pain, than is the muscular coat of the stomach which this matter so grievously disturbs, and which needs only to be freed from the disturbance to return at once to healthful quiescence, and, if the primary irritation have ceased to operate, to that ordinary exercise of functions which in health is so tranquil as not to be a subject even of consciousness.

On these principles, then, the cure of gastrodynia requires that the mucous membrane be freed from the redundant secretion with which it is loaded and oppressed, and that a healthful state of the secreting membrane be established so as to guard against renewed accumulation. And here it may be remarked that accomplishing the former purpose ministers to the latter; for when the accumulated mucus is dislodged by suitable evacuates, not only is a direct source of irritation removed, but the secreting organs are restored to a more effective exercise of their functions, by which the primary irritation, and the congestion consequent to it, are best and most effectually relieved. The effect of irritation is congestion of bloodvessels with hyperæmia of the capillaries, and these beget increased secretion from the mucous follicles by which the overcharged vessels are unloaded, and the natural cure of the disease effected. When these conditions and natural changes are clearly understood, the treatment of the disease becomes simple in the extreme; and if the success of others in treating the malady on the principles here inculcated but equal what the writer of this essay almost daily witnesses, he will have little apprehension either of the pathology here advanced being rejected, or of the practice enjoined being condemned.

It may throw some light on the subject to consider the circumstances which tend to excite and vitiate the gastric secretions so as to induce this form of disease. Though luxurious living is a fruitful source of gastric disturbance, yet gastrodynia is not the most frequent conse-

quence of such indulgence. Much more generally does the disease assail the poor and ill fed, amongst whom it is very prevalent. How far it is caused in them by poverty of diet or by abuse of stimulants, it would be difficult to determine. Our own impression is that the former cause is most influential. A poor vegetable diet, when taken for a constancy under circumstances that would demand food of more nutritive quality, weakens digestion, as is evidenced by flatulency, acid eructations, heartburn, and other dyspeptic manifestations. Whether as cause or consequence of these disturbances, irritation of the mucous membrane may be presumed to exist. We have seen that irritation begets hyperæmia of the capillaries; that this leads to increased secretion of mucus; that this mucus is capable of accumulating and of acting as a foreign body, inducing a secondary irritation; and that it is this secondary irritation which is the most probable exciting cause of that spasmodic pain which characterises gastrodynia. Deficiency of food may be readily conceived to produce similar effects. However this be, (for we contend not for the conjectural expositions thus hazarded) the important fact is, that in gastrodynia the mucous secretions of the stomach are redundant and depraved, and that the removal of this offending matter, and the re-establishment of moderate and healthy secretion, are the essential means of cure. It may be objected that the evidences of redundant mucus are not always demonstrable; that the practice resulting from this theory is often inapplicable if not injurious; that remedies very different from those which we enjoin succeed in giving relief. To these representations we would reply, that if the causes assigned be proved to exist in the more exquisitely formed cases, a fair analogy justifies an extension of the same reasoning to the slighter shades of the same malady,—that the term pain of stomach is so vaguely applied, that the most opposite conditions of that organ are incongruously classed together under it, to all of which the same treatment cannot be suitable,—and that when remedies the opposite of those which we enjoin succeed best, the disease will on investigation be found to be of a character very different from that which belongs to the subject of this essay. We are aware that pain attends a state of stomach marked by high irritability, sickness, vomiting, with other corresponding symptoms; and that this is best relieved by soothing remedies, and often by the suspension of all irritation, perfect abstinence being often the best of all remedies. Castor-oil as an aperient, cooling salines, prussic acid, will here give relief, when drastic purges or cordial remedies would exasperate. But this disease is essentially different from the one now treated of: it is acute, while pure gastrodynia is chronic. The pain is continuous, while that of gastrodynia occurs in paroxysms. Its consideration, therefore, belongs rather to the head of gastritis than of the disease now under discussion.

The reference to a poor vegetable diet, and to a deficiency of nutriment as giving rise to that

condition of stomach which produces gastrodynia, would serve to explain why this disease among the poor is in general so little liable to pass into inflammation, and also why the combination of cordial remedies with purgatives is still so eminently serviceable. The supposition, however, of vegetable food being unsuited to dyspeptic ailments is often egregiously misapplied when these occur among the higher classes of society. Such patients are continually enjoined to live almost exclusively on animal diet, all vegetable matter being interdicted as if it were poisonous. This is a great misconception, for if a due admixture of vegetable food with animal be not borne by the stomach, there is always something to correct which no precision of mere diet will ever thoroughly rectify, while an exclusive use of animal food begets evils far more serious than any to which mere dyspepsia can ever give rise. A brief case may illustrate this. A delicate female suffered long from what was called weak stomach, and was enjoined an animal diet, all vegetables being prohibited. Experiencing some relief, she pursued this system until increasing plethora induced determination of blood to the head, ending in violent epilepsy. By active discipline this was relieved, and it afterwards became necessary to restrict the animal diet and return to vegetable. The stomach, improved by the depletion and other evacuant treatment required for the epilepsy, now bore vegetable food without inconvenience, and in getting rid of her epilepsy she became released also from her dyspepsia. In gastric derangements, therefore, the general state of constitution should be regarded no less than the local ailments. If plethoric, depletion with low diet will be most suitable; if low and impoverished, depletion will of course be improper, save the evacuations which the special derangement may require; and sustenance must be more liberally allowed. It is of importance, however, that no mistake be committed in this respect, and that the deceptive feebleness which frequently attends and results from a plethoric state of constitution, be not confounded with pure debility arising from insufficient nutriment; of which subject a full elucidation will be found under the article PLETHORA.

As evacuation of the stomach and bowels by suitable purgatives forms an essential part of the treatment of gastrodynia, it becomes expedient to offer here a few remarks on the differences of operation observable among purgative medicines, as a guide to the judicious selection and adaptation of them to the cure of this complaint.

In considering the operation of cathartics, it is necessary to bear in mind that the stomach forms part of the alimentary canal, and that, although emetics are its more immediate evacnants, it both requires to be cleansed, and admits of being so by means of suitable cathartic medicines. In the operation both of emetics and purgatives some well-marked differences are respectively distinguishable. Of emetics, some merely eject the floating contents of the stomach, while others cause

it to throw off also its mucous secretions. Examination of the matter discharged by vomiting furnishes abundant evidence of this fact. In the operation of purgatives there is a still greater variety; and these, though divided generally into cathartica mitiora and aciora, or laxatives and purgatives, seem to admit without violence of still further distinctions. Some merely carry forward the foul contents, gently exciting the peristaltic motion of the intestines, and thus emulating the natural processes; others, in addition, act on the exhalent arteries, producing copious watery stools; and a third class, while they expel feces, and are capable of producing liquid stools, have the further power of emulging the follicles which line the mucous membrane, causing them to throw off the redundant secretion which adheres to and oppresses them. When the bowels are merely inactive, their secretions healthy, and no constitutional disease present, simple aperients of the first sort suffice to obviate costiveness, and prevent feculent accumulations; medicines of the second are necessary when, besides unloading the bowels, it is required to allay fever and abate arterial action by reducing the volume of the circulating fluids; those of the third are called for when, in consequence of increased action in the vascular system, or of special irritation, the natural mucus of the stomach and intestines is inordinately secreted, or when it becomes viscid and of morbid character, so as, by its special irritation, to give rise to or aggravate disease.

The special medicines belonging to each class will naturally suggest themselves to every practitioner. A precise arrangement of them on the principle here noticed is not required, and would serve no useful purpose. The same medicines act differently on different constitutions, and it is to the effect rather than to the medicine producing it, that attention should be directed. Castor-oil, sulphur, manna, and such like, are medicines of the first class; to the second, chiefly, the saline aperients are to be referred; and to the third various vegetable cathartics, such as aloes, colocynth, jalap, &c. variously combined with each other, and, as occasion requires, with certain metallic salts and oxides, which powerfully aid their operation. These salts and oxides are principally of antimony and mercury, which in their effects on the gastro-intestinal mucous membrane differ more in degree than in kind; each, while it affects more particularly one part of the canal, being capable of exerting its influence on the whole. Thus tartarised antimony, the more immediate effect of which is to excite vomiting, with discharge of mucus from the stomach, is also well known to purge; and calomel, chiefly used, when given with cathartics, to increase their purgative effect, often excites sickness and vomiting. These facts are important for guiding us to a discriminating use of purgatives in the cure of gastrodynia.

The spasmodic pain of this disease being traceable to the irritation caused by redundant

and vitiated mucus, and the discharge of this proving the most effectual means of relief, it is obvious that to whatever antecedent deviation from health its production may be owing, the first indication is to effect its removal by well-adopted evacuants. Various auxiliary remedies are no doubt valuable, and of these several will be noticed; but it cannot be too deeply impressed that unless the main object of removing the offending cause be accomplished, all means which act merely by allaying pain must prove of transitory effect, if not wholly abortive. And here we may cursorily remark, that however the practice inculcated in this essay may seem to flow from the theory proposed, it was not originally derived from it; on the contrary, it was from the signal success of the practice, with close and patient observation both of the phenomena of the disease and the effect of remedies, that the theory was deduced. From the pathology advanced, it might seem to follow that emetics, and especially those which dislodge the mucous secretions of the stomach, would be the direct and appropriate means of cure. Such remedies are no doubt applicable, but in the larger portion of such cases milder treatment will fully suffice. Besides, though pain of stomach is the prominent symptom, disease is not confined to this viscus, but extends along the intestinal tube, the secretions of which evince a state of vitiation corresponding to that of the stomach, whence a necessity exists for cleansing not only the stomach but the whole intestinal canal; and this is most effectually done by combining remedies which are capable of acting on every part of it. The combination which effects this purpose most completely is colocynth, or any similar drug, united with calomel and tartarised antimony in due proportion. After what has been said, the rationale of its operation can need no further explanation.

In the form and degree in which the disease ordinarily presents itself, very mild treatment suffices to remove it; yet if this be not employed, it may continue to harass the sufferer for months or years. A few active purges, of colocynth and calomel, with or without the addition of antimony, cleanse the stomach and bowels, while mild cordials given in the intervals relieve flatulency and abate uneasy feelings.

In hundreds of cases treated at the Bath United Hospital, the common cathartic pill of the house (composed of four grains of colocynth and one of calomel), and a form of cordial mixture which has been in use there for half a century, are the only remedies required; and by means of this simple treatment relief is afforded almost uniformly, and within a very short time. At first the stools are almost always dark, foul, and slimy; and it is interesting to observe how improvement of stools and decline of symptoms keep pace with each other. So long as the stools continue foul, the disease does not thoroughly yield, nor can the use of remedies be relinquished; and it is of importance to attend to this connexion,

for if consciousness of recovery induce the patient to forego the use of medicines ere healthy stools be re-established, either renewed disease or impaired general health will inflict the penalty of his precipitancy.

We are no advocates for the continued use of medicines however mild, but much experience has satisfied us that until a state of healthy secretion be established in the intestines, especially after long derangement of their functions, there is hazard in foregoing the assistance which nature requires. Two of the cathartic pills above mentioned, taken every other night or twice a week, operate in general as much as is needed. But such patients are frequently so costive as to have no stools but by means of the pills, and need aperients in the intervals. For this purpose the common black draught may be given; but when such costiveness prevails, it becomes expedient, after a few doses of colocynth and calomel, to give every night, or night and morning if necessary, colocynth, aloetic pill, or any corresponding aperient, to the necessary extent. An excellent combination for this purpose is colocynth conjoined with henbane; two parts of the former to one of the latter. While the purgative treatment is pursued, much relief is afforded by the daily use of the cordial mixture already noticed; and so valuable has this been found as an adjuvant, that it may not be amiss to give here its precise formula. It is the *mistura salina cardiaca* of the hospital pharmacopeia. By whom it was introduced we have been unable to trace, but it has been in constant and extensive use for upwards of half a century; and though the simplicity and apparent inertness of the compound may excite a smile, we can faithfully declare that we know not a more valuable adjuvant wherever purging, such as we have described as necessary in gastrodynamia, is required for the correction of intestinal derangements. It is valuable, too, in many other disturbances of gastric and intestinal functions, which it would be foreign to our present purpose to discuss. The mixture is thus prepared:—

R Sodæ subcarbonatis, ℥i℥.

Aquæ puræ, Ovi℥ss.

Acidi sulphurici diluti, ℥i.

Confectionis aromatici, ℥iii.

Spiritus menthæ piperitæ, ℥iii.

The foregoing quantities thus combined yield 324 grains of sulphate of soda, 423 grains of the subcarbonate remaining unaffected by the acid. Thus each ounce of the mixture contains but a few grains of either salt; yet, insignificant as the dose may appear, it is not inert. It is very possible that practitioners often err, especially in the treatment of chronic maladies, from requiring an obvious effect from each dose administered; and that where it is ascertained that a medicine actual possesses inherent powers, the slow and almost imperceptible exercise of these powers should not be despised. There is often more wisdom in seconding the efforts of nature than in superseding them. When offending matter is to

be removed, which the natural efforts, if unassisted, are unable to expel, adequate means must be employed, and evidences of effective operation required; but in restoring the weakened secretory organs to more healthy actions, perhaps the gentle agency of the *mistura cardiaca* may accomplish what more distinguished tonics fail to effect. We have given the formula chiefly to illustrate the treatment which we recommend, without any prejudice in favour either of the ingredients or proportions. If the principle be admitted, each practitioner may employ whatever form of cordial medicine his own experience may lead him to prefer; the object of the present work being not to lay down arbitrary rules, nor prescribe specific remedies, but to guide the young practitioner by elucidating the pathology of the several diseased conditions treated of, and establishing the principles on which rational treatment should be pursued.

So prompt and effectual is the relief afforded by the foregoing treatment in common gastrodynamia, that opium and strong stimulants are never needed. It has been shewn that, as these have no effect in removing or correcting the cause of disease, they are not the appropriate means of cure; and in this respect practice and experience fully confirm what theory would dictate. Indeed, they are not only unsuited to the cure, but when exclusively relied on, they tend to aggravate the disease and render it inveterate. The pain arises from contractile efforts of muscular fibres forcibly exerted. These are excited by the morbid mucus with which the stomach is coated, and their tendency is to throw off the offending matter. To repress the effort by narcotics or overcome it by stimulants, leaving the offending cause unremoved, is not rational practice; while the effect of such remedies immediately on the discerning membrane is to confirm the morbid actions by which the secretions had become depraved, thus adding to the evil and rendering its ultimate correction only the more difficult. All this may be deficient in proof, but it accords with all that the most successful treatment of the disease teaches. When opium is trusted to for subduing the pain of gastrodynamia, we have already said, that by frequent recurrence to it, increasing doses become requisite in order to produce the desired effect. A habit is thus acquired of pernicious tendency, and under which the whole constitution is sure to decline. The extent to which opium has been administered for this purpose has been often enormous. An old and experienced physician once told us with much self-complacency, that he had just given laudanum, in full doses, quickly repeated, to the extent of two hundred and sixty drops to relieve pain of stomach; and if the remedy had been appropriate, he would have been right in disregarding quantity, the effect, not the dose, being the object most important. But denying as we do the principle, we must condemn the practice as both empirical and injudicious. Cases may, no doubt, occur of such intense suffering as to demand full doses of opium for prompt relief; but they must be

very rare, for in a wide field of hospital practice, in which gastric derangements abound, we never meet with them. Were such a case to present itself, we should have no objection to give a full dose of opium, combined with calomel and antimony; but we would as soon as possible resort to that treatment by which alone, according to our views, the disease can ever be effectually relieved.

The patients who apply to the Bath United Hospital on account of gastrodynia have some of them suffered for weeks, months, nay years. It could not be expected that all would be relieved with equal ease, and yet the difference in this respect is much less than might be imagined. Although in recent cases removal of the cause at once arrests the spasmodic efforts which occasion the pain, it does not follow that it should succeed with equal promptitude where from long continuance the spasmodic efforts have acquired the additional force of habit; and accordingly it happens that the pain sometimes lingers even after a healthy state of bowels has been re-established. This state affords opportunity for proving the relative efficacy of auxiliary remedies. Of these the most powerful of all that we have tried is the oxide of bismuth, though how it acts we are ignorant, our use of it being purely empirical. In the dose of five grains, with one of aloes, given three times a day in conjunction with the cordial mixture, it rarely fails in this stage of the disease to give relief. In some cases spirit of ammonia is a useful addition to the mixture. A combination of equal parts of the cordial mixture and camphor julap furnishes a modification which agrees with many, especially when, as occasionally happens, hypochondriacal depression attends. Blisters to the scrobiculus often render essential aid in protracted cases. In obstinate cases we have often given purges of oleum terebinthinæ, either alone or combined with oleum ricini, and with sensible advantage, being led so to employ it from having witnessed its efficacy in improving the stomach where tenia had been suspected, but where no worm was found. A remedy of this kind, however, is rarely needed. All that has yet been said applies solely to simple gastrodynia, and for its full and effectual relief we believe the treatment enjoined to be amply sufficient. If the principles, however, which we advocate be confirmed by more extended experience, individual practitioners may modify the treatment, both direct and accessory, in whatever way their judgments may direct.

It is not our province to discuss here the more formidable maladies of which pain of stomach is but a symptom, such as scirrhus, cancer, ulceration, &c. One contingent ailment only, connected occasionally with gastrodynia, shall we here notice. Simple gastrodynia is a chronic disease, being unattended with fever or acute symptoms of any kind. Occasionally, although spasmodic pain of stomach be the chief complaint expressed, acute symptoms are seen to attend. The pulse is quick, the tongue is white, the heat of the skin is

greater than natural, and there is pain on pressure at the scrobiculus. These symptoms mark inflammatory action, which calls for its proper treatment. Venesection may here be needed; cupping or leeches over the stomach are always proper; blisters, too, may be required. The purgative formerly recommended may here seem unsuitable, yet we have not experienced any objection to its use. Should it cause pain or increase irritation, a milder should of course be substituted. If inflammation be very acute, the proper treatment of gastritis should be employed, and perfect abstinence may be advisable; but this activity of disease we have not witnessed, as contingent to gastrodynia. While inflammatory symptoms continue, it is advisable to forego the *mistura cardiaca* for one more cooling and febrifuge. Any form of antimonial saline may answer, or, what is still better if the bowels be tardy, a solution of epsom-salt in rose infusion, which will often lie on the stomach, even when simple diluents are rejected. When the inflammatory symptoms subside, the cordial mixture may be renewed with advantage. And here it may not be amiss to inquire how it is that cordial remedies are at all applicable under such circumstances, when every degree of excitement would appear incompatible. The fact that they are borne, and with advantage, is too well established to be set aside or referred to misconception, and in the researches of pathological anatomy a rational exposition may perhaps be found. Andral, in pointing out the lesions of the gastro-intestinal mucous membrane, having shewn that hyperæmia of it may be divided into three heads, as it is situated in the capillaries particularly, in both capillaries and larger vessels, or in the larger vessels only, thus proceeds: "Of these three kinds, the first belongs almost exclusively to a state of irritation, and is an almost certain proof of its existence; the second belongs equally to a state of irritation and to a state of congestion, from a mechanical cause that has acted during life or after death; the third but rarely depends on the last cause, but yet neither does it announce a state of irritation similar to that which produces a hyperæmia of the capillaries only. In fact, when the congestion is thus confined to some of the tolerably large vessels that are distributed under the gastro-intestinal mucous membrane, we have reason to think it belongs to a state of irritation that is on the decline, and we may even admit that in such cases all irritative process has completely disappeared, and that the blood, which is still accumulated in some vessels, appears there only because these vessels, having been distended by the unusual quantity of blood that traversed them as long as the irritation continued, remain passively dilated after all irritation has disappeared. This is what often takes place in the mucous membrane of the eye, in which long after the capillaries of the conjunctiva have ceased to admit blood, some larger red vessels still continue to appear on that membrane. It there frequently happens that by applying sub-

stances of a more or less stimulant nature to the conjunctiva, these vessels are forced to resume their natural dimensions, and to get rid of the blood which constantly tends to dilate them. *May not this help to account for the success which sometimes attends a tonic mode of treatment when employed towards the end of certain kinds of irritation of the alimentary canal?*" The quotation is so apposite to the subject under discussion, that, however long, we can need no excuse for thus introducing it.

It may, perhaps, be surmised that we ought to have adduced authorities in support of the opinions which we advance; but, in truth, we know not where any exist that would have suited our purpose, which, as being that of the work for which we write, is to furnish a safe and rational guide to the inexperienced practitioner. To glean from all who have treated of stomach complaints would swell this article to a cumbrous extent, and be, as we conceive, unprofitable. What we have stated, we faithfully believe to be true; and as the views which we here present are not to be found in practical works, even the most modern, we conceive that we best discharge the duty allotted us by giving them as our own judgment and experience dictate, without diverging into controversial comments, or the equally unsatisfactory practice of advancing what we could not vouch for as true.

Dr. Cullen, in discussing dyspepsia, dismisses the treatment of gastrodynia in a single sentence, merely stating that it may be sometimes relieved by carminatives, but most certainly by opiates. Dr. Darwin, while he distinguishes cardialgia as a specific disease, assigns no place in his nosological arrangement to gastrodynia. Dr. Mason Good, too, our latest projector of a methodic nosology, has seen reason for separating cardialgia from dyspepsia, and considering it a distinct disease, but he has not so distinguished gastrodynia. Dr. Heberden, the most purely practical of modern authors, attempts no pathology of the disease. He recites various influences by which it is affected, but concludes with saying, "*modo profuerunt, modo nocuerunt, et interdum fuerunt supervacua.*" For simple gastrodynia he recommends Bath waters, bitter and aromatic powders or infusions, with rhubarb or aloe to move the bowels, and some aromatic tincture to be taken after dinner. In fine, Dr. Abercrombie, the latest and best of our practical writers on gastric complaints, in his valuable *Researches on Diseases of the Stomach*, &c. takes due notice of gastrodynia, and points out some important differences in the forms which it assumes, with conjectures on their respective nature. Still not having facts on which to found a rational pathology, he attempts none; and with regard to practice his words are, "It is difficult to say what remedies are best adapted to each of these forms of gastrodynia." As the result of his own experience, he recommends sulphate of iron, combined with aloe and aromatic powder, oxide of bismuth and rhubarb, lime-water and small doses

of opiates, and in obstinate cases, bleeding, blistering, and farinaceous diet. It thus appears that the subject of gastrodynia required further investigation, and that a more discriminating practice in the treatment of it was greatly needed. How far the present essay contributes to supply the want, time and the experience of others must determine. We can only say that we have not presumed to put forward crude speculations or mere conjectures, but solely what we regard as practical truths. Sixteen years ago we published in the *Edinburgh Medical and Surgical Journal* similar views of this disease, in an essay entitled *Pathological and Practical Observations*; and in the interval which has since elapsed, we have seen nothing to alter materially the opinions then expressed; their truth being, to our conviction at least, fully proved by the uniform experience of an extensive hospital practice, in which gastric derangements particularly prevail.

(E. Barlow.)

GASTRO-ENTERITIS.—In the articles **ENTERITIS** and **GASTRITIS**, we have given a succinct description of the effects of inflammatory disease on the different portions of the digestive tube, and of the consequences of this disease on the functions of the system generally. We have also endeavoured to shew that the coexistence of inflammation in the stomach and in the remainder of the tube is not so universal as to form a law in pathology; so that, in the actual state of medicine, the following proposition of Broussais cannot be adopted:—"L'inflammation de la membrane interne ou muqueuse de l'estomac s'appelle *gastrite*; mais elle n'est jamais vérifiée sur le cadavre qu'avec celle de la muqueuse des intestins grêles. Il faut donc mieux lui donner le nom de *gastro-entérite*."*

Yet it is true that in most of the cases where inflammation either in its primary or secondary form is met with in the digestive tube, it occurs both in the stomach and in some part of the intestines. This we have verified by numerous observations, and it is more particularly to be observed in the diseases of the gastro-intestinal tube which occur in fever, and in many other cases where a typhoid state exists.

It is a fact, and we state it with regret, that the pathology of the digestive system is far from being generally understood in these countries. In consequence of this, a mode of practice disgraceful to science, and productive of the most extensive injury to human life, has been too generally adopted. In many instances,—indeed as a matter of daily, hourly occurrence,—practitioners appear to forget the existence of such an organ as the gastro-intestinal mucous membrane; and many a life is in consequence sacrificed to empiricism, to wilful prejudice, or to ignorance. Several causes have concurred to produce this state of things. Of these we may mention the following as principal:—the excessive importance which has

* Broussais, *Commentaires des Propositions de Pathologie*, cxxx.

been long attached to alterations of the liver; the spread of the doctrines of Hamilton, so popular to many minds from this, that under the name of science was put forward an empiricism easy in its application though destructive in its results, and saving the trouble of thinking and the necessity of study; the works of Abernethy, in which, though approaching to the truth, this great man did not wholly divest himself of the prejudices imbibed by early education. But we believe that there is another source, the effects of which should form a warning to all medical writers. The great facts connected with this subject, contained in the writings of Broussais, and which he was the first to proclaim to the medical world, have been received with distrust, because they were appealed to as the support of doctrines which were not found to stand the test of observation; and thus, in the rejection of the theory, have the facts been disregarded. But if the French school has gone too far, and assumed, in its generalizations, more than their facts would warrant, the British school has been culpable in rejecting those results of observation of which the ardent minds of our neighbours have made an unwarrantable use. Under such circumstances, then, how careful should a writer be; for thus not only may his own reputation suffer, but mankind be deprived, for a time, of the most valuable knowledge.

We have already alluded to the great frequency of inflammations of the digestive tube. When we take this fact into consideration, and recollect that from the singular sympathies of the digestive system a very slight disease may produce severe effects on the economy, the importance of the investigation becomes evident. Let us compare, in the latter respect, the gastrointestinal surface with the bronchial mucous membrane. In this last an extensive inflammation may exist, and yet without producing a tithe of the morbid effects on the economy which a much more circumscribed and slight gastro-enteritis will induce. In the case of serous inflammations, also, we see another example of the superiority of the sympathies of the digestive over those of the respiratory system. A pleuritis, as compared with a peritonitis, is a mild disease, and seldom fatal in its acute stage. In almost every recorded case, peritonitis from ulcerative perforation of the intestine has destroyed life with rapidity; yet in how many instances have patients lived for weeks or months with a pulmonary fistula, and consequent empyema and pneumothorax.

In the articles above referred to we have merely detailed the history and symptoms of this disease, without entering on the highly important question of its complication with other diseases, a complication already shewn to be of extraordinary frequency, and one which the study of physiology would lead us to expect. Nutrition being the fundamental function of animal life, nature has endowed its apparatus with sensibilities more delicate, and sympathies more active, than any other: hence it is scarcely possible for any morbid action of consequence to exist without its being felt in

the digestive system, where it will at first produce functional derangement, and sooner or later structural alteration. With these views let us briefly investigate the complication of gastro-enteric inflammation with disease in the nervous, respiratory, and circulatory apparatuses.

I. Diseases of the brain, both acute and chronic, are commonly complicated with gastrointestinal disease, which is in many cases the point of departure of morbid action, though in some the consequence of the reflected irritation of the inflamed brain. The headach, the somnolence, which so constantly follow an error in regimen, are examples of a slight degree of irritation of the brain, induced by the sympathetic action of the digestive system,—a degree of irritation which, if more severe, or too often repeated, may come to actual inflammation. The occurrence of epilepsy or convulsions from the same cause is familiar to every practical man, and points out to the physiological observer the close connexion of the systems, and the danger of over-stimulating the digestive apparatus. These are examples of acute attacks from which the system often relieves itself without consequent injury; first, because the irritation of the digestive system is generally transient; and, secondly, because the brain is not yet disorganized. But when inflammation becomes fixed in the digestive system, either in its acute or chronic form, then we may see, in the first case, the most marked evidence of cerebral irritation; and the records of medicine abound with examples where, in the second case, the long-continued sympathetic excitement has produced or been followed by a variety of diseases of the brain, and where the original affection was unknown or mistaken, and consequently maltreated.

We are far from believing that most cases of cerebral irritation are secondary to a gastro-enteritis; but medical writings—not to mention our own observation—can be safely appealed to in support of the doctrine that a number of them are thus produced: and it is to the important consequences of this knowledge that we wish to call the attention of our readers. From ignorance of this fact, many cases of arachnitis, and especially that of children, are improperly treated; for the cure is attempted by revulsion upon the originally suffering organ. In the language of the day, the purging practice gets a "*fair trial*," and the child dies more often of the exasperated intestinal inflammation than of the disease in the brain. From this complication not being recognized, every one must have seen great errors in practice. More than once, in cases where convulsions had supervened on symptoms of gastric disease, we have seen the cure attempted by the exhibition of the most stimulating antispasmodics—a practice always improper, but in such a case mischievous in the highest degree. We recollect more than one instance in which eminent practitioners prescribed for this disease a combination of ether, ammonia, tincture of assa-fetida, camphor and opium, where every dose produced a convulsion. In one of these cases

life was apparently saved by a timely inhibition of the antispasmodics, and the substitution of drinks of cold water, (the best medicine in such a case,) and the use of leeches to the head and epigastrium.

We have already given examples of the effect of gastro-intestinal inflammation in inducing irritations of the brain and spinal marrow in the adult, and have alluded to the remarkable fact, that where the sympathetic excitement of the nervous system is severe, many of the proper symptoms of the original disease are absent. This fact, observed by Hippocrates, is one of great practical importance, as it teaches us that in such cases the most violent disease may exist in the digestive system without pain, and often without other symptoms commonly observed in the uncomplicated disease. On this subject Lallemand makes the following excellent remarks:—"It is not because the pain of the head is more severe than that of the abdomen, &c. that this disappears, for there is frequently no headach; it is not because the inflammation is more violent, since a serous or sanguineous effusion will produce the same result; but it results from this, that pain being the result of a sensation perceived by the brain, whatever alters its functions removes this symptom of the inflammation. But if this inflammation be intense, it is not influenced in its development by the cerebral affection, and all its other phenomena continue, because, unlike the sensibility, they are not under the dominion of the brain: *the disease runs its course in a more dangerous manner, because it is more difficult to recognize, and causes death, which is attributed to the cerebral affection, although this is but a secondary disease.* On dissection, we are often surprised to find so little relation between the symptoms (cerebral) and morbid alterations."^{*}

The supervention of fever in the course of softening of the brain is generally owing to some inflammatory affection of other organs. The seat of this is so frequently in the digestive system, that in such cases the mere occurrence of fever should lead us to investigate narrowly the state of the digestive tube. All the cases where fever occurred, as recorded by Lallemand, presented this complication, although in most of them the belly was soft and free from pain. The importance of these facts in the treatment of cerebral disease must be evident to every unprejudiced mind, more particularly when the revulsive treatment is considered. How constantly is the emetic and purgative plan used for the relief of cerebral diseases; and yet there are abundant facts to prove that such treatment, as a general rule, is always hazardous, and often the immediate cause of death. The writings of Desault have been one cause of this prejudice in favour of the revulsive treatment, as directed on the digestive system; but how few follow exactly the mode which he has laid down. Practitioners seem to forget that it is clearly illogical to

conclude, as so many have done, that, because a moderate revulsive treatment is useful in injuries of the head, the same is equally applicable to idiopathic encephalitis: the cases are essentially different. Morel, in his translation of the work of Richter on wounds of the head, states that the experience of five years, during which he was a pupil of Desault, has taught him that the success of the tartrate of antimony in injuries of the head was never attributable to the vomiting which it might produce, but that, on the contrary, this result always exasperated the disease. Lallemand declares that tartar emetic is a most hazardous remedy in cases of cerebritis, as, whether it produces vomiting or is retained, it may be injurious; in the one case apparently from the mere act of vomiting, in the other by inducing a gastro-intestinal inflammation.

With respect to purgatives, we are far from wishing to inhibit their employment in cases of disease of the brain, as there are unquestionable instances of their utility; but we protest against their empirical employment, and insist on the necessity of carefully investigating the state of the mucous membrane, and of bearing the facts which have been detailed in mind, before we attempt anything that may compromise the integrity of so important an organ.

In the treatment of delirium tremens we have often witnessed the worst effects from overlooking the state of the stomach. Although we do not believe, with Broussais, that this affection is merely the result of the sympathetic irritation of the brain from an inflamed stomach, yet we feel satisfied that in those cases where the disease has supervened on a debauch, there is more or less of gastric inflammation. From not recollecting that most important law in pathology, that similar symptoms may be induced by opposite states of an organ, a grievous error is commonly committed in the treatment of delirium tremens. For example, a person who has been in the daily habit of drinking spirits meets with an accident; he is placed in an hospital and debarred from his usual indulgence; symptoms of delirium tremens supervene, *which are found to subside on the stimulus being resumed.* From this fact has arisen the practice of giving stimulants in the disease occurring after a debauch, but it requires little acumen to see that these are two essentially different cases. We have often witnessed the result of this unphilosophical treatment: the symptoms of delirium tremens are converted into those of encephalitis, and a violent gastritis or gastro-enteritis is induced.

In the case of debauch the stomach has been over-excited, and is probably inflamed; another organ is suffering, and of course many of the proper symptoms of gastritis will be wanting: but even where there was no indication of gastritis but thirst and epigastric tenderness, we have seen the most striking effect on the nervous symptoms produced by leeching the epigastrium: we have seen it remove the tremor, the giddiness, and the want of sleep.

II. Let us next examine the coincidence of

* Lallemand, *Lettres sur l'Encephale*, 2.

gastro-enteric with pulmonary inflammation. An extensive hospital experience has proved to us that this is a most frequent occurrence, and one of vast importance in the treatment of disease. There is a circumstance connected with this complication which is often a source of its diagnosis, namely, *that it frequently gives to the disease a typhoid character*. We say frequently, because we have seen the combination to exist without typhoid symptoms, and because we have known simple pulmonary inflammation to cause these; but these cases seem to be exceptions to the general rule.

This combination of gastro-intestinal with pulmonary inflammation takes place equally in affections of the mucous membrane, of the parenchyma, and serous investment. It is also an almost constant attendant on phthisis, in which its supervention exercises a remarkable influence on the progress and curability of the disease.

One of the most frequent forms of disease in Dublin is that which may be termed the gastro-catarhal fever. It is a disease in which there is an inflammation both of the pulmonary and gastro-intestinal mucous membranes. It is one of great danger, and from the following circumstances:—1. the existence of an intense gastro-enteritis; 2. the fact that the bronchitis is almost always double and universal; 3. that at the time when the bronchitis is passing into the second or secretive stage, there is generally profound debility, so constant in gastro-intestinal disease: expectoration cannot take place, and the patient dies of asphyxia. These are sufficient to prove the danger of this disease; and we may add that, as in the complication with cerebral disease, the gastro-enteritis in this instance is *constantly observed without pain, tenderness, or vomiting*.

In such cases it would appear that the mucous inflammation is in some instances the cause, in others the consequence of the fever; but whether it be cause or effect, it is to its reduction that the efforts of the physician are to be mainly directed. How important, then, must be the recognition of the gastro-enteritis. Independent of any theory, an extensive experience has led us to conclude that in these cases all practice tending to relieve the chest by revulsion to the gastro-intestinal surface, whether by nauseating or purgative medicine, is improper. The chest will not be relieved, and the gastro-enteritis will invariably be aggravated. The true principle of treatment is to deplete both the respiratory and digestive systems, and this is to be effected chiefly by local bleeding and counter-irritation. We say local bleeding; for in many of these cases general bleeding is inefficacious and sometimes injurious. This result appears due to the gastro-intestinal complication; for in simple bronchitis the lancet is constantly of the greatest utility.

There is a remarkable fact connected with this disease, to which we have alluded in the article ENTERITIS,—namely, that the inflammatory action seldom possesses the same degree of intensity in both systems at once:

we observe a species of alternation of intensity. Thus, when the swelling and tenderness of the belly, the diarrhoea, the redness of the tongue, and the typhoid symptoms are best marked, we find the face least livid, the breathing and cough easier, and the stethoscopic signs of disease by no means so evident. But in the progress of the same case the gastric affection will appear to subside, to be replaced by all the signs of an intense bronchial inflammation. In the course of a gastro-catarhal fever this change of symptoms may occur several times. The knowledge of this is of practical importance, for the apparent diminution of the symptoms of gastro-enteritis does not imply that the parts have become healthy; and if we practise on this supposition, we may be sure that the abdominal disease will reappear with violence. This we have seen to occur from a dose of tartar emetic, or a purgative pill. In some cases where the patients have died during the exacerbation of the bronchitis, we have found numerous intestinal ulcerations, although the surrounding mucous membrane was pale. (See ENTERITIS.)

The practical conclusions which the knowledge of the gastro-intestinal complication leads us to, appear to be the following:—

1. That, as a general rule, the lancet is to be used with much more caution in this complication than in simple bronchitis.

2. That we are to place our chief reliance on local bleeding and counter-irritation, on both the chest and abdomen.

3. That the emetic and purgative treatment is in these cases highly dangerous.

4. That the combination of mercury with opium exhibited so as to induce ptyalism, appears to be the remedy most entitled to confidence, after local bleeding and the use of blisters.

5. That the apparent subsidence of one class of symptoms does not imply that the disease from which they arose has subsided.

6. That in the convalescence of these patients peculiar attention must be paid to the state of the gastro-intestinal tube, as a slight error in diet or an over-dose of laxative or purgative medicine may be productive of the worst results.

The existence of a bronchitis is much less likely to induce a gastro-enteritis than the latter to induce the former. This, however, is only one of the exemplifications of the fact that the digestive system is endowed with more powerful sympathies than any other. Facts are still wanting on the subject of thoracic disease supervening on abdominal, but every observer must admit its frequency. We have thus a key to the explanation of the tussis verminosa, the tussis hepatica, the dyspeptic phthisis, &c. A circumstance of not uncommon occurrence well illustrates the danger of the empirical treatment of gastro-enteric inflammation. When the disease predominates in the lower part of the tube, diarrhoea, as formerly stated, is a common symptom, either as occurring from acute or chronic enteritis. Nothing is more common than the treatment

of this by astringents, or by stimulants, such as the turpentine. Now we have frequently observed that, where the secretion was thus arrested, the diseased action appeared to be immediately translated to the bronchial surface, and these cases are always of the worst description. All the results of inflammatory action on the lung may be thus produced, yet the evil is seldom attributed to its proper source. The best mode of avoiding this accident in cases where we are forced to resort to the astringent and stimulating treatment of diarrhoea, is at the same time to determine to the skin; and the means which have succeeded best in our hands are the warm bath, counter-irritation on the abdomen, and the use of flannel next the skin. We should also in the treatment of such a case diligently watch the state of the respiratory function, and on the first appearance of disease, as shewn either by symptoms or the stethoscopic signs, immediately omit the remedies calculated to arrest the abdominal secretion.

Of the combination of pneumonia with disease in the digestive tube, we have witnessed a vast number of cases, and it appears highly probable that the disease termed by the older authors the *putrid pneumonia*, *pneumonia typhodes*, &c. is an example of this combination. About two years ago, so many cases of this disease were admitted into the Meath Hospital that it might be considered as epidemic in Dublin. The patients generally presented the following symptoms. There was great prostration, often much more than could be accounted for by the extent of the pulmonary affection as observed by the stethoscope. The skin was generally cool and clammy, and frequently covered with small livid petechiæ; the pulse small and feeble, and the countenance collapsed and anxious. But little pulmonary oppression was complained of; there was cough, and in some cases the rusty sputa occurred, while in others nothing but a little colourless mucus was expectorated. The detraction of a few ounces of blood almost invariably produced syncope, and did not afford any relief to the patient. In a few cases the blood presented the inflammatory crust, but in the great majority this appearance was absent. In addition to these symptoms we remarked a red and crusted tongue, and, frequently, sordes on the teeth; there was thirst, some swelling of the belly, which was tender, particularly in the epigastric and right iliac regions, and often diarrhoea. The intellect was obtuse, and occasionally a low delirium supervened. On examination by the stethoscope and percussion, the usual signs of the different stages of pneumonia were observed, and in several cases the disease, contrary to its usual course, occupied the superior portions of the lung.

This was an extremely dangerous and unmanageable disease; many of the cases proved fatal, and in those where the disease was arrested, the convalescence was very tedious and doubtful. The pulmonary congestion resolved with great slowness; and where hepatization had occurred, the dulness on percussion con-

tinued for a great length of time. The patients remained in a semi-hectic state, and nutrition went on slowly. In the fatal cases death appeared to be induced much more by the abdominal than the thoracic disease, which was seldom so extensive as to account for the fatal termination. On dissection, the various appearances of the different stages of pneumonia were found. The stomach was generally more or less vascular and softened; but it was in the lower third of the ileum that the greatest destruction was found. Here the mucous membrane was intensely injected and of a purplish red colour. The glands of Peyer and Brunner had become extensively ulcerated, and in some cases suppuration of the mesenteric glands was observed to a great extent. The blood was fluid and dark-coloured, and the peritoneum had a livid hue.

If we compare the description given of the *nervous peripneumony* by P. Frank, we must observe a striking resemblance between it and the disease under consideration. In both we have the pulmonary inflammation conjoined with a group of typhoid symptoms. He also speaks of an epidemic pneumonia combined with gastric symptoms, and in both cases points out the inability of the patient to bear free bloodletting. From the light which the study of the phenomena of gastro-enteritis has thrown upon the nature of typhoid inflammations, there can be little doubt that in these cases much of the typhoid character is owing to the abdominal complication, and we may consider the nervous and putrid pneumonia of the older writers as of this nature.

But does the mere existence of this gastro-enteric inflammation necessarily produce a typhoid state in cases of pulmonary disease? or are both the pulmonary and gastric symptoms the result of the secondary inflammations so constant in fever? We incline strongly to the latter opinion, as we have seen an intense enteritis with pneumonia where the typhoid symptoms were absent, and where the patient bore large bleedings well. But in a practical point of view, this question is not of great importance; because, whether the gastro-enteritis be the primary affection, or secondary to the typhoid state, its existence is of the greatest importance in the prognosis and treatment of the case. This we have mentioned in the article GASTRITIS, where it is stated that the tartar-emetic treatment of pneumonia, as recommended by Laennec, is full of danger in these cases. The opinion of this author, that a gastro-intestinal complication does not contra-indicate the use of tartar-emetic in large doses, in cases of pneumonia, is one of the few errors in the work of that great man,—an error which it is much to be feared he was led into by his too great prejudice against the doctrines of the physiological school.

We have not observed in this disease, as in the gastro-catarrhal fever, those remarkable alternations of symptoms between the chest and abdomen; the character of the disease being seldom changed throughout its course.

The practical conclusions which the knowledge of this complication of pneumonia leads to are the same as indicated when speaking of the gastro-catarhal fever. In this disease the strength of the patient must be supported by farinaceous foods, jellies, and chicken-broth, from an early period, even while we are using local bleeding to the chest or abdomen. The best internal remedy seems to be the combination of calomel with Dover's powder, given with a view to induce pytalism. This should be assisted by mercurial frictions. As soon as the gums are decidedly affected, the inflammatory action often begins to subside. At this period we have also found the greatest advantage from the use of the polygala senega, exhibited in the following manner:

R Decoct. polygalæ senegæ, ℥vii.

Tinct. scillæ marit. 3ii.

Tinct. opii camphorat. 3vi.

Carbonat. ammoniæ, gr. xv.—℥i. M.

capiat coch. ampl. i. secundis horis.

If this remedy be given before pytalism is induced, it will not be found beneficial; but after this effect has occurred, it will seldom disappoint the practitioner. This will be generally the time to administer small quantities of wine, regulating its use by the effect on the pulse and fever. When, after the use of wine, the frequency of the pulse is diminished, and its fulness increased, we may be sure that the remedy was indicated.

We must never forget that for the successful treatment of the case, both during its acute stage and convalescence, *the double seat of the inflammation must be constantly kept in view.*

The occurrence of inflammation of some part of the digestive tube in cases of phthisis is a circumstance of extreme frequency in this disease, and one that exercises a powerful influence on its progress and the chance of recovery. It most usually presents itself under the symptoms of what is called the phthisical diarrhoea, but has been observed in a much more acute form.

As in cases of idiopathic gastro-enteritis, and in that supervening in fever, so in this disease we may meet with the inflammation in some cases predominating in the upper, in others in the lower part of the tube. The lesions of the mucous membrane of the stomach are indicated by loss of appetite, nausea, bilious vomiting, and epigastric pain; the tongue may or may not be indicative of the gastric disease. These symptoms we regret to say are generally disregarded in cases of phthisis, and in numerous instances we have seen the worst consequences from this oversight. The vomiting in particular is attributed to the effect of coughing, as in pertussis, and there is no doubt but that it may be thus induced; but in those cases, as Louis has remarked, the appetite is good, the digestion easy, and the epigastric pain is wanting. It is further to be recollected that vomiting independent of disease of the stomach most commonly occurs in the early periods of the case; but that in the more advanced stages it is almost always the result of gastric inflammation. On this subject, however, it would

not be right to omit the following remark of Louis:—"Nevertheless, in this instance, as in a thousand other circumstances, there are facts which defy the sagacity of the observer, and form exceptions to the most general laws. Thus in the last months of his existence, one of our patients had epigastric pains, nausea and vomiting, both during the cough and its intervals, although the mucous membrane of the stomach was perfectly healthy.*"

As an encouragement to our paying particular attention to the state of the stomach, it may be mentioned that there are facts on record which prove that, even in phthisis, an ulcer of the stomach may become cicatrized. The gastritis in this disease is almost always secondary to the tuberculization of the lung; but by interrupting nutrition, and by the prostration of strength which it induces, it exercises a most fatal influence on the progress of the disease. Seldom recognised, and constantly exasperated by the introduction of stimulants under the name of tonics and expectorants, it adds incredibly to the sufferings of the patient; and where from this mistaken treatment, and from the use of stimulating diet, it becomes acute, the respiration grows hurried and laborious, and additional blisters are mercilessly laid on the patient's chest, while the source of his increased suffering is wholly overlooked.

But the most striking as well as most frequent indication of abdominal disease in phthisis, is the occurrence of diarrhoea, a symptom the nature of which is not yet sufficiently appreciated by medical men. From the fact that this symptom is occasionally suspended when the perspirations are copious, an occurrence by no means so general as has been represented in books, it is looked on as a sort of vicarious discharge, and its cause, which is an enteritis, is seldom recognized. From this error great injury constantly follows. Diarrhoea in phthisis is an almost certain indication of disease in the mucous membrane and glands of the ileum and colon; a chronic inflammation, terminating in ulceration of these tissues. In the present state of pathology, it may be laid down that diarrhoea in phthisis almost never occurs without enteritis; and further, that in this disease we may have some degree of enteritis without diarrhoea. This, however, is a rare case, and in our experience has only occurred where the colon escaped alteration. The experience of more than a hundred cases, in which we have made a post-mortem examination, has convinced us that in phthisis the diarrhoea is the result of inflammation and ulceration of the intestine,—a conclusion which we look upon to be as free from exception as any doctrine in medicine can be; but one, however, which, though not new, is far from being sufficiently recognized. It is most important to consider this secondary enteritis, in cases of phthisis, both with a view to the curability of consumption, and also to its palliative treatment. Of one fact we are convinced, namely, that the absence of enteric

* Recherches sur la Phthisie.

inflammation greatly prolongs the existence of a phthisical patient, and of course increases the chance of a cure. We know that in most cases of chronic phthisis an attempt at cure is established by nature, the mechanism of which has been developed by the immortal Laennec. For the success of this attempt two conditions appear requisite,—one, that the life of the patient shall be prolonged so as to allow time for the cicatrization of the abscess; the other, that the tuberculization of the lung shall not advance so as to produce too extensive disorganization of the part. Now the first of these is mainly influenced by the supervention of the enteritis. In all the cases of very chronic phthisis which we have observed, the intestinal disease either did not occur, or only supervened at the very close: in these cases the disease lasted for years. But we believe also from observation, that the second condition is greatly influenced by the state of the digestive system; as, after the diarrhœa has commenced, the disease, as observed by the stethoscope, has advanced with increased rapidity; a circumstance not at all strange to the pathologist, and explicable by the sympathetic irritation and lesion of nutrition.

We have now had the good fortune to witness the recovery of several patients in whom the stethoscope unequivocally indicated the existence of tuberculous cavities. *In none of these cases was there any enteric complication.* The disease advanced slowly, and time was given both for the efforts by nature, and the operation of remedial measures.

From considering phthisis in all cases merely as a pulmonary affection, and from not estimating the importance of gastro-intestinal disease as influencing its progress, a fatal error is commonly fallen into: this we have often witnessed. A young female ceases to menstruate; this may or may not have been preceded by pulmonary irritation; but in most instances some affection of the lungs is present: she gets worse, and consumption is apprehended; the symptoms are attributed to the amenorrhœa, and the cure is attempted by forcing the uterine action by the medicines called *emmenagogue*. A variety of substances, all highly stimulant to the gastro-intestinal surface, are exhibited; many of them, such as aloes, savine, &c. &c. of a drastic nature; the result of which is, that a diarrhœa is established, attributed at first to the medicines, but from its obstinacy shewing that it proceeds from a diseased state of the bowels. The phthisical symptoms advance rapidly; the menses do not reappear; and the patient dies of what is called a *galloping consumption*. We have actually known cases where the emmenagogue system was continued after the phthisical diarrhœa was established, and cavities formed in the lung. Such lamentable circumstances may well be appealed to by those who ridicule medical science; but the opprobrium ought to fall on the individual practitioners who will not stoop to learn what the science is capable of teaching.

Although so instrumental in accelerating the fatal termination of phthisis, enteritis is sel-

dom a cause of sudden death in this disease. Notwithstanding the number and extent of the ulcerations, yet perforation of the intestine and consequent peritonitis is extremely rare; a most interesting fact, and one which we have endeavoured to explain in the article *ENTERITIS*. The only case of phthisis in which we have found perforation of the intestine was an example of acute development of tubercle, accompanied with intense pulmonary irritation and obscure abdominal symptoms. On dissection, several perforations were found, but the fecal matter had not escaped into the serous cavity. The disease in the intestines was most extensive, and could never have been suspected from the symptoms;—another instance of the latency of abdominal inflammation when other disease exists. This case is published in the fifth volume of the Dublin Hospital Reports. We have witnessed one case, where sudden death occurred from hemorrhage of the bowels. The patient in an advanced stage of phthisis, while at stool, suddenly fell down dead. A large quantity of blood was discovered in the night-chair; and on dissection the colon was found extensively ulcerated and filled with blood. This termination of phthisis is, we believe, not noticed in any of the systematic works. The case will be found in the Transactions of the Association of the College of Physicians of Ireland, 1827.

In the more acute forms of phthisis, the complication with enteritis may also exist; but on this subject facts are still wanting. In some instances we have seen the disease commence with violent symptoms of bronchitis and dysentery, and pass into those of phthisis and diarrhœa. These cases were not unfrequent after the late epidemic fever in Dublin, and were observed chiefly in the convalescent patients. One case occurred during this period which is remarkable, as it presented the symptoms of an intense irritation of the gastro-intestinal mucous membrane, yet on dissection this tissue was found generally healthy. The solid viscera of the abdomen, however, were universally tuberculated, the tubercles being in great quantity and in various stages from the milinary to the crude state. The lungs were completely filled with milinary and granular tubercles, and the bronchial mucous membrane highly vascular. From the symptoms referable to the abdomen, we fully expected to find an intense gastro-enteritis; there being tenderness of the abdomen, with tumefaction, purging, the tongue dusk-coloured, great thirst, delirium, and involuntary evacuations. The only morbid appearance in the tube was a slight vascularity and softening of the ileo-cæcal portion, with some enlargement of the muciparous glands—an extent of disease quite insufficient to account for the symptoms. How far these are to be referred to the condition of the solid viscera is a subject for further investigation.

In the treatment of phthisical diarrhœa it is of consequence to bear its true pathology constantly in mind, even though we should despair of effecting a cure. The disease itself is so full of danger, and the symptom so distressing,

that its palliation is an object of great importance; and this will be best effected by acting on pathological principles. Although astringents are not unfrequently our only resource, yet their indiscriminate use is dangerous, as the checking of the secretion may be followed by increase of fever, and great aggravation of the pulmonary symptoms. This is more commonly observed in cases where the disease has not arrived at its last stages. The mind of the practitioner should be impressed with the fact that the disease is an enteritis, and to be treated as such; and we can safely assert that in hospital practice we have found the application of a blister to the abdomen seldom fail in arresting the diarrhoea, and giving the greatest relief. In this practice there is no danger, for it is not empirical; we do not arrest a secretion without removing or modifying its cause. In more than one case in which astringents and opiates had failed, this practice was followed by a permanent removal of the diarrhoea.

In our treatment of phthisis we should never lose sight of the following facts and conclusions with respect to the gastro-intestinal system:—

1. That a complication with some form of gastro-enteritis is exceedingly frequent.

2. That this complication is to be guarded against as far as possible, as its supervention exercises a fatal influence on the progress of the pulmonary disease, a result explicable by the lesion of nutrition and the sympathetic irritations.

3. That when the disease predominates in the upper portion of the tube, we have the usual symptoms of chronic gastritis super-added to those of phthisis; and when in the lower, diarrhoea is the most prominent phenomenon.

4. That where the signs of disease of the stomach exist, the diet must be of the most unstimulating kind, and that we cannot hope for benefit from tonic, stimulating, or expectorant medicines.

5. That in all stages of the disease, purgative medicine, particularly of the drastic kind, must be avoided.

6. That the diarrhoea of phthisis is the result of an enteritis with ulceration of the intestine, and that hence the indiscriminate use of astringents is as objectionable in this as in other forms of intestinal disease. (See DIARRHOEA.)

III. The limits of this article will not permit us to enter on the interesting questions of the connection between gastro-enteritis and disease in the circulatory and genito-urinary systems; but we shall say a few words on its complication with *hepatic disease*.

There is no part of the digestive apparatus to which the attention of physicians has been so long directed as the biliary system. The diseases of the liver, indeed, have been more studied than all the other lesions of the digestive apparatus; a circumstance mainly arising from the long reign of the humoral pathology, which attached such importance to the composition of the bile, and referred so

many diseases to its alterations. Much of this doctrine still remains, although modern medicine has shewn, whilst still allowing the necessary importance of the biliary apparatus, that we must consider it, both physiologically and pathologically, as secondary in importance to the gastro-intestinal surface.

The general similarity of symptoms that arise from abdominal disease tended much to retard our knowledge of the importance of diseases of the digestive tube; as in thousands of instances these were and still are described as examples of hepatitis either acute or chronic. This is an error so great, and one so universal in these countries, that it is no exaggeration to designate its consequences as dreadful.

Hepatitis in these countries is much less frequent than inflammations of the digestive tube,—a fact established by pathological anatomy, and one, the more extensive recognition of which would be fortunate for the British public. From mistaking gastro-enteritis for affections of the liver, two great evils result;—one, the neglect of the actual disease; the other, its exasperation by the means supposed capable of removing the hepatic affection. Revulsion to the mucous membrane is attempted; in other words, a tissue already in a state of inflammation and the source of the symptoms, is submitted to a double stimulation. Disorganization is thereby effected, and what was at first a simple and curable disease of the mucous membrane, becomes a chronic and incurable lesion, not only of this tissue, but of the solid viscera of the abdomen. The patient dies; and in the hepatic and splenic disease then observed, the practitioner sees a vindication of the treatment which has assisted to produce them.

The relation which exists between secreting organs and the surfaces with which they communicate, is not sufficiently recognized by practical men. It is a subject full of importance to the practice of medicine. Without denying that the glands in question may primarily contract irritation, yet Bichat has shewn that the natural mode of excitement of these organs is a stimulation exerted on the surface of relation with which they communicate; a stimulation which, in the state of health, will only induce the physiological action of the organ, but which, if excessive or too constantly repeated, will ultimately induce disease in the secreting organ itself, by the operation of one of the best established laws in physiology or pathology. We must admit that in declaring, as a general rule, that all inflammations of the liver are secondary to a gastro-enteritis, Broussais has come to a too sweeping conclusion. He deserves great credit, however, for demonstrating the frequency of the sympathetic irritation going on to true inflammation, and thereby rendering the liver itself a centre of fluxion. These remarks apply more especially to the supervention of chronic hepatitis on long-continued stimulation of the stomach and duodenum, the consequence of a life of luxury or indulgence in ardent spirits. When the liver-disease is established, it is plain that a

principal indication will be to remove or modify the original exciting cause, and to adopt such treatment as may have least chance of exasperating the diseased state of the mucous membrane.

The production of hepatitis consequent on gastro-intestinal inflammation is a subject not yet wholly cleared up. In all probability its most common cause is the sympathetic irritation, or increase of the excitement which the surface of relation naturally exercises on the secreting organ. But there are cases in which additional causes seem to have acted. Thus it is believed that in some instances, inflammation has spread by continuity of surface from the duodenum along the biliary ducts,—an opinion, however, which requires further confirmation before it can be adopted. Bouillaud and Ribes believe that in many cases the inflammation is conveyed to the liver along the internal coat of the vena portæ and its ramifications; and in the *Clinique Médicale* by Andral, two cases are recorded confirmatory of this opinion. The first is of a patient who was attacked with fever and gastro-enteric symptoms, followed by painful tension of the right hypochondrium and slight jaundice. On dissection, the stomach, lower portion of the ileum, and the cæcum were found inflamed. The liver was enlarged, very red, and much engorged with blood. It was further found that the internal surface of the inferior mesenteric veins, the trunk of the porta, and its ramifications, was intensely red, while the splenic vein and the cava appeared natural. The aorta was white; and hence it was concluded, and we think justly, that this was an example of inflammation of the abdominal veins,—a phlebitis, which being propagated to the liver, was the cause of the hepatic disease. In the second case the first symptom was a diarrhœa, followed by pains in the region of the liver, jaundice and ascites. On inspection, the liver was found in the state of red induration, and the internal surface of its veins vividly red. The same was observed in the trunk of the porta and its hepatic branches, the internal membrane of which was soft, friable, and in many places lined with an unorganized false membrane. The gastro-intestinal system presented marks of extensive chronic disease; and it is only to be added, that the general vascular system was found perfectly healthy; so that we cannot attribute the appearances in the porta to any thing but inflammation.

These cases are probably analogous to that described by Reynaud, in a patient who had experienced several attacks of jaundice, in which the right branch of the porta and the inferior cava had become obliterated. A collateral circulation was established principally by means of the external veins, not however sufficient to prevent the occurrence of dropsy.

The following conclusions seem fairly deducible from the recent researches of anatomists, with respect to the connection between gastro-intestinal and hepatic disease:—

1. That in most cases of hepatitis there is a complication with gastro-intestinal inflammation.

2. That in the majority of instances where this complication has occurred, the hepatitis has been secondary to an acute or chronic gastro-enteritis.

3. That in such cases the supervention of the hepatitis does not imply the subsidence of the gastro-intestinal disease.

4. That in the smaller number of cases the hepatic disease has preceded that of the intestine.

5. That idiopathic hepatitis may occur without any gastro-intestinal complication whatsoever. This is the rarest case.

6. That in cases where the complication does exist, we cannot always find that the intensity of the one disease is proportional to that of the other.

The influence which inflammation of the upper part of the digestive tube, particularly of the duodenum, exerts in producing hepatic disease, has been much insisted on by the physiological school. That many instances of hepatitis are thus induced, there can be no doubt; but it is true that cases have occurred where this portion of the tube was found perfectly healthy.* We formerly alluded to the production of jaundice from gastro-duodenitis, and believe that it is its most common cause. It is a curious fact, that in the yellow fever, where gastro-enteritis is so frequent, inflammation of the liver is rarely observed, although considerable alteration of the colour and consistence of this viscus is common.

IV. But we have yet to handle one of the most important parts of this subject, namely, the connection between gastro-enteritis and the phenomena of fever. Were we to enter into this at full length, we should far surpass the limits of this article; but we shall content ourselves with enquiring how far that part of the doctrine of Broussais, which refers continued fevers to a gastro-enteritis, is capable of proof. Here we wish to correct an error which is general,—namely, that Broussais attributes *all* fevers to a gastro-enteric inflammation. Such is not the fact, as all candid persons will admit who consider the two following propositions of his doctrine:—“*Les irritations intenses de tous les organes sont transmises au cœur; alors il précipite ses contractions; la circulation s'accélère, et la chaleur augmentée de la peau détermine une sensation pénible: c'est ce que l'on doit appeler la fièvre, qui est ici considérée d'une manière générale.*” (Prop. cx.) “*La fièvre n'est jamais que le résultat d'une irritation du cœur, primitive ou sympathique.*” (Prop. cxii.)†

The following is the opinion of this author on the subject of the connection of gastro-enteritis and fever. He believes that acute gastro-intestinal inflammation, when exasperated, will represent what has been called the putrid, adynamic, or typhous fever; and that in those cases where the sympathetic irritation of the brain is considerable, the disease will represent the malignant ataxic or nervous fevers.

* See the works of Louis, &c.

† Broussais, *Commentaires des Propositions de Pathologie*, 1829.

The truth of this proposition is not to be denied ; but when he declares that all the essential fevers of authors are to be referred to a simple or complicated gastro-enteritis, we believe that he has not made out his case.

It cannot be denied that this doctrine, received at first with such contempt, and scouted so generally by medical professors, especially in this country, has gained ground to a remarkable extent ; and although few, except the immediate pupils of its founder, go to the full length of his opinions, yet all who look at disease with an unprejudiced eye, and who enjoy opportunities for observation, now admit that in the production, progress, and phenomena of fevers, the digestive tube takes a most important part. In fact its pathology furnishes a key to the treatment of a vast number of cases formerly termed essential or idiopathic fevers ; a denomination, happily for mankind, now beginning to be forgotten.

Will gastro-enteritis cause the phenomena of fever ? and what will be the character of that fever ? The state of the science on this subject can be shortly expressed. Gastro-enteric inflammation may cause all the phenomena of fever. It will especially cause prostration, head-ach, delirium, subsultus, coma, thirst, anorexia, sordes, morbid tongue, tympanitis, petechiæ. All these symptoms may subside under treatment calculated to remove a gastro-enteritis, and will be exasperated by an opposite treatment. This inflammation further may present this group of symptoms without pain or tenderness of the abdomen. On this subject we shall quote from Andral :—“ Confirming by our researches the admirable observations of M. Broussais on the painless character of a great number of intestinal inflammations, we stated in 1823, that we might be exposed constantly to overlook the most intense enteritis, if we only admitted its existence in cases where pain occurred. Since the publication of these researches, numerous works published by disciples of the most different schools, have shewn that the intestines may be very profoundly affected without pain being present. We have seen this pain wanting, 1st, in cases of simple erythema of the mucous membrane ; 2nd, in those where numerous exanthematous patches covered the small intestine ; 3rd, where the large intestine was affected ; 4th, where there were ulcerations, either in the ileum, cæcum, colon, or rectum. We have found the deepest ulcerations in subjects where there was no pain ; and it is to be remarked that we only speak here of cases in which the intellect of the patients was not affected.”*

The knowledge of these most valuable facts requires to be spread much farther than has been hitherto done. Many practitioners cannot separate the ideas of pain and inflammation, and it has again and again happened to us to see the most fatal results from this scholastic error.

One of the most constant characteristics of

the fever in this disease is prostration ; and there is no local inflammation which will so peculiarly induce this state as an acute gastro-enteritis. The fever may be inflammatory or typhoid in its symptoms ; it is commonly similar to the synchus of Cullen ; it may be remittent or even intermittent. To prove every part of this proposition thousands of cases may be cited.* Gastro-enteritis may, then, occur with every form of fever ; but it may also exist without fever ; from which fact an argument may be drawn against the doctrine that the typhoid or adynamic fevers are nothing but examples of gastro-enteritis either simple or complicated. It is plain that these affections present a pretty constant and peculiar group of symptoms, and that, even supposing gastro-enteritis to exist in them all, there must be something else to give the disease its peculiar character.

Let us examine the state of the digestive tube in fevers, particularly that of the stomach and small intestines. Now there is abundance of facts to prove that when death occurs in the course of a fever, we may find the stomach healthy, and even in the cases where alterations of this viscus are found, they have no peculiar appearance so as to constitute an anatomical character ; nor, as Andral remarks, are they different from those in the bodies of others who have died of various acute and chronic diseases. We cannot then affirm that every continued or typhous fever implies the existence of a gastritis, or that this disease will cause the phenomena of fever in all instances.

But the alterations of the small intestine are much more constant, and it was from this circumstance that the doctrine of Broussais mainly arose. We apprehend that an inflammation of the mucous glands is much more frequent in Paris than in this country ; and it was natural to consider the disease in the intestines, with regard to the fever, in the same light as an inflamed state of the lung was considered with regard to the symptoms of pneumonia. Louis also, one of the most accurate and trust-worthy investigators, has declared that the inflammatory development of the mucous glands is the anatomical character of typhous fever. But even admitting that such was universally the case, still the doctrine that the symptoms of fever in these cases proceeded from this disease would not be proved, because the intestinal disease may as well be considered as secondary to the fever as the pustules of small-pox to the state of the system induced by its contagion. No one would say that the cutaneous eruption was the cause of small-pox, and we cannot help believing that the “intestinal exanthem” in many fevers is produced by a similar process, and bears a similar relation to the constitutional affection.† But whether the intestinal disease be primary or secondary, it becomes absolutely necessary, in

* See the works of Andral, Louis, Bonillaud, Bretonneau, Reederer and Wagler, Boissseau, Hewett, Bright, Abercrombie, Cheyne, &c. &c.

† See the experiments of Gaspard, Majendie, &c. Journal de Physiologie.

* Clinique Médicale.

cases where it is recognized, to direct our treatment toward its removal, and carefully to avoid every thing that can exasperate it. We believe that the disciples of Broussais may have carried the antiphlogistic plan too far in fever; but if they have killed their thousands, the followers of Brown and Hamilton* have killed their ten thousands. In the treatment of fever there are two great points for the practitioner to look to,—one, the strength of the patient; the other, the state of the viscera. In the majority of cases his practice should be to remove local inflammation, for it is of this that ninety-nine out of the hundred die; but should a case arise where, from the condition of the patient, he cannot attempt to fulfil the latter indication, let him at least not exasperate the disease.

What is the common treatment of fever? a bottle of wine on the one hand, and a bottle of purging medicine on the other; and this for all fevers and all stages of the fever! We do not wish to be understood as decrying the use of tonics or purgatives in all cases, but we do protest, in the name of common sense and humanity, against their indiscriminate employment. The experience derived from the treatment of several thousand cases of fever has convinced us of this fact, that in the treatment of this disease, particularly in its early periods, we shall be more certain of advantage from leeching the abdomen, cold drinks, and emollient enemata, than any other treatment whatsoever.

We cannot conclude this hasty review of the subject better than by the following quotation from Andral:

“Does this coincidence of lesions and symptoms suffice to shew that the *dothin-enteritis* causes the whole disease? We would willingly reply in the affirmative if we did not take the following great facts into consideration:—

“1. When, from injecting different putrid substances into the veins of an animal, we produce all the symptoms of the severe fevers of the human species, there are cases where at the same time we cause various lesions in the intestinal mucous membrane, particularly various degrees of follicular tumefaction and sometimes ulcerations. At other times in these experiments the same symptoms were produced without any trace of lesion being found in the intestine. In this second case we cannot attribute the symptoms to a lesion of the digestive tube which did not exist. In the first case it is plain that the intestinal lesion was an effect, and that it was only developed by the introduction of deleterious substances into the circulation. 2. Observations formerly cited do not permit us to doubt that in the human species symptoms completely similar to those which coincide with *dothin-enteritis*, may occur without it, and without any lesion of the digestive tube. 3. The intensity of the lesions which characterise *dothin-enteritis* is not

always in relation to the severity of the symptoms observed during life.”*

But even with the facts as stated above before us, it must be admitted, that when all those facts recorded in the present article and the two preceding so often referred to, are duly considered, the doctrines of Broussais, with respect to gastro-enteritis, are highly worthy of a careful examination, and do not deserve to be designated, as they so constantly are, as the vague fancies of a heated imagination. When we reflect on the vast influence which gastro-intestinal inflammation exerts in the phenomena of most fevers; that in many of the eruptive diseases it is present and constitutes their danger; that in the varieties of cholera it is a common occurrence; that dysentery, diarrhœa, and a host of abdominal affections are its results; and that it produces the most important modifications in all other diseases,—complications, on the recognition of which their successful treatment mainly depends;—we cannot help expressing a feeling of gratitude to the great pathologist who has awakened the attention of the world to this universal and destructive disease. It is absurd to reject facts because their discoverer may have made use of them to form a theory which the progress of science has partially disproved; and it is worse than ungenerous to deny him that civic crown which he has so truly and gloriously earned.

(William Stokes.)

GLOSSITIS, (derived from *γλῶσσα*, the tongue,) *inflammation of the tongue*. Although in strictness of language the term *glossitis* may be applied to the partial inflammations of this organ, frequently induced by the direct application of irritants, whether taken into the mouth with food or drink; of corrosive or acrid substances, or occasioned by mechanical injury, such as the forcible inclusion of the tongue between the teeth, or by friction against the ragged edges of such as may have been broken or decayed; it is nevertheless generally used to denote a specific inflammation either of the substance or coverings of the tongue, or of both, induced through the medium of the system, or sustained by a peculiar condition of the organ itself. Some diseases of the tongue, however, of which inflammation has only been one of the conditions, and others in which all the characteristics of it have not been present, have been occasionally described under this name.

The partial inflammations just noticed seldom require further therapeutic consideration than the avoidance of those causes which may renew irritation, and the removal of others that may continue to exist; the operation of nature under such circumstances being almost always sufficiently sanatory without the interference of art. It must indeed excite surprise, that an organ so constituted, so frequently exposed to the action of irritants, and so often exhibiting changes sympathetic with morbid

* We must admit that much of the abuse of purging in fever has originated in a misconception of the real doctrine of Hamilton.

* *Maladies de l'Abdomen.*

conditions of other parts of the body, should be so little prone to incur either this or any other idiopathic disease. The little liability to extension of inflammation excited by mechanical or chemical irritants is within proof of every one's experience; but in some instances in which the disposition to scirrhus has been latent, its development has soon followed the inflammation consequent to the injury;—a sufficient reason for inculcating the necessity of avoiding all causes by which it might be aggravated.

The same remarks are applicable to general inflammation of the coverings or substance of the tongue, to which some peculiar predisposing state of the organ itself, influenced probably by a particular state of the constitution, added to that of an inflammatory habit or sanguineous temperament, is conducive. Of the nature of these predisposing causes we are yet ignorant, and rather than waste time in discussing the mere conjectures which have been offered to explain them, we shall avail ourselves of the technicality of science, and include them under the term *idiosyncrasy*.

The exciting causes doubtless consist of those which are common to inflammations in general, and are such as contribute to repletion, either by food or drink; the suppression of accustomed discharges or of natural secretions, particularly of perspiration, either general or local, from exposure to cold; the immoderate use of stimulating liquors; and the direct application of corrosive or acrid substances. The same mechanical and chemical irritants which we have stated to be exciting causes of partial inflammation may also produce the general affection which it is our present design to discuss.

Idiopathic inflammation of the tongue, or glossitis, is a very rare disease, and very formidable in itself, as well as in reference to its influence on the functions of respiration and deglutition, both of which are in general materially impeded by its presence; the former so much so as to endanger life. It commences with the usual constitutional symptoms common to inflammatory diseases, accompanied with some uneasiness of deglutition; the tongue is rendered painful, and the patient sensible of its enlargement, which is evident on inspection: its surface, at first very red, soon becomes coated, except at the tip and lateral margins, with viscid whitish mucus; the articulation is indistinct, and any attempt to move the organ, or pressure upon it, increases pain: the saliva appears to be profusely secreted, but the inability and disinclination of the patient to remove it from the mouth accounts, in a great measure, for the accumulation and dribbling which are always going on. The local pain increases with the progress of the swelling, which is very rapid; speech and the natural motions of the tongue are consequently more and more difficultly performed; and the augmented bulk, encroaching posteriorly on the space assigned to the passage of air and nutriment, increases the difficulties of respiration and deglutition. The pressure also is a source of irritation to the larynx, and occasions a cough, which under the

circumstances of the disease is peculiarly harassing; and the cavity of the mouth being too small to contain the tongue in its increased volume, the organ is consequently protruded. In this state it is obvious that a mechanical impediment must exist to the free course of the blood to and from the head; and from this cause there takes place a throbbing of the arteries, an undulatory motion in the jugular veins, lividity of the complexion, an unnatural prominence of the eyeballs, altogether occasioning an appearance of fulness of the face similar to that consequent to strangulation from any other cause: the accompanying sensations are pain of head, and generally in the ears, vertigo, sometimes indistinct vision, and confusion of mind, or even delirium; considerable pain is also often experienced in the tract of the spinal cord and parts adjacent, from the cervix downwards.

The constitutional or febrile symptoms are influenced by the local affection: the pulse is frequent, full, and hard, but smaller as the disease advances, and as the impediment to respiration becomes greater; the skin, which in the early stage is dry and burning, at length is bedewed with accessions of cold perspiration; there is excessive thirst, the bowels are confined, the urine is red, sparingly secreted, and deposits the lateritious sediment. The patient in this state can rarely sleep, and the irritability of the nervous system rapidly leads to an alarming degree of exhaustion. It occasionally happens that the inflammation is confined to one half of the tongue, the raphe being the line of demarcation between it and the unaffected side. In such cases the constitutional as well as local symptoms are materially modified; so also are they by a variety of other circumstances, such as the extent of the inflammation, the age and temperament of the individual, and the habit of body which may have immediately preceded the accession of the disease.

The progress of glossitis is like that of other inflammations, and terminates either in resolution, suppuration, gangrene, and change of structure, or conversion into other disease. When the inflammation of the mucous membrane of the tongue has been excessive, the lymph effused has been formed into a distinct expansion, like that which usually is found to take place in *cynanche trachealis*; and as the tendency is probably always the same, the occurrence, we conceive, would be more frequent but for the constant interruption to its formation, to which, in the mouth, it is necessarily liable. A case of this nature has been recorded by Frank of Vienna, who has referred to a preparation illustrative of the disease in another instance, preserved in the museum of Hunter.*

The period which glossitis occupies, and its several stages, are very variable in different cases, and influenced by the modifying circumstances already noticed, as well as by the remedial means which may have been adopted. Its disposition to terminate in resolution is in some cases manifested so early as the second or

* *Acta Inst. Clinici Univ. Viennæ, Anno sec. p. 51.*

third day, but seldom before the fifth or sixth. The indications are, a progressive diminution of the morbid bulk of the tongue, and of the pain accompanying it; its surface becoming moister; the thick coat with which it was covered disappearing; a progressive return of power and inclination to use it; with a proportionate decrease or even cessation of febrile symptoms, as well as of those stated to be consequent to plethora in the vessels of the head.

To illustrate the progress of the disease, and its auspicious termination, we subjoin a short sketch of a case described by the writer just alluded to.

A healthy youth, nineteen years of age, was suddenly attacked with febrile symptoms, together with pain in the head and throat, difficulty of deglutition, and cough: these having been neglected, increased, and during the night he experienced very acute pain at the end of the tongue, increasing in extent and severity with its progressive swelling, which was rapid and considerable, filling the whole cavity of the mouth, and rendering him unable to articulate. The following day he complained of pain in the head, especially towards the forehead, with increase of sensibility of the eye to the impression of light; the tongue was remarkable for its red colour, increase of size, rigidity and heat; the patient could neither draw it inwards nor extend it; the sublingual glands and tonsils were tumefied; he was incapable of speech and deglutition; complained of great thirst, had a dry burning skin, and a frequent strong pulse. Copious perspiration of a sour odour came on in the night, the swelling of the tongue and tonsils subsided, and with it the febrile symptoms; the tongue became moist, deglutition easy, and the following day restoration to health seemed to be established.

Suppuration succeeding to glossitis is indicated by some diminution of excitement of the system, with an accession of coldness over the surface of the body, or a distinct rigor, the local pain being somewhat diminished if the abscess be superficial, but the swelling increasing, and at no distant time, in one part or another, becoming particularly prominent. Under the same circumstances the appearance at the pointing part differs from that of the surrounding structure, and to the sense of touch it is soft and elastic, shewing plainly the existence of an abscess, which, if not artificially opened, at length by natural process allows its contents to escape. When, however, the pus is deeply imbedded in the substance of the organ, there being little cellular membrane in the construction of the latter, it separates the parts in proportion to the quantity secreted without diffusing itself, and therefore acts as a wedge, and, from the condensation and sensibility of its structure, the organ is little if at all relieved, as usually happens in most other parts by the effusion of this fluid. By active treatment, however, adopted in the early stage of the disease, suppuration may generally be prevented; but when the presence of pus is ascertained, no time should be lost in relieving the organ of it.

The termination of glossitis in gangrene is

a very rare occurrence, and has happened only in constitutions extremely debilitated by intemperance or disease. The reduced state of the vital powers manifested in the feeble performance of the general functions of the body, and the blackened appearance of the tongue, the peculiar odour, and loss of sensibility, of pain, and of heat, will denote the morbid changes in progress. It has been remarked that the separation of the mortified from the living parts has been particularly rapid when gangrene has taken place in this organ.

A careful consideration of the symptoms of idiopathic glossitis already detailed will afford the readiest index to determine its presence, and to distinguish it from symptomatic inflammation, as well as from other morbid states. The connecting links between local injury and consequent inflammation can be too easily traced to admit of error; and the enlarged states of the tongue arising from the specific operation of mercury, and sometimes consequent to the absorption of particular poisons, are attended with symptoms too peculiar to themselves, and not sufficiently characteristic of idiopathic glossitis, to render any discussion on their diagnostic distinctions necessary. The same remark is applicable to the tumefactions of the tongue which sometimes occur in fevers of a malignant type, as in typhus and variola; or those metastases of inflammation which, though most rarely indeed to this organ, have been found to occur in arthritic and rheumatic cases with its simultaneous subsidence in the part originally affected.

Idiopathic glossitis must at all times be considered a very formidable disease, and the degree of danger, in a previously healthy subject, will be proportionate to the obstacle which the tumefied organ may present to respiration, and to the opportunity which may be offered of subduing the inflammation on which it depends. From active treatment in the early stage a favourable issue may reasonably be anticipated, particularly if a mitigation of symptoms is seen to follow the successive application of remedial means; but if the disease be neglected in the early stage, or the volume of the tongue increase, in resistance to the measures resorted to, respiration will be performed with proportionably greater difficulty, threatening extreme danger to life by suffocation; and in persons predisposed to apoplexy or other cerebral disease, in an additional degree, by the impediment occasioned to the free return of blood from the head, and the consequent aggravation of these diseases. Diminution in the volume of the tongue, whether by artificial means directly applied, or through the medium of the system, will proportionately subtract from the danger and increase the rational hopes of recovery; but if the inflammation should have proceeded to gangrene, the danger to life will be influenced by the probability presented by constitutional circumstances of arresting its progress, and, when effected, by the extent of the mortified part: the tongue being the organ of taste, and necessary to the perfection of speech, of mas-

tication, and of deglutition, these functions will be affected commensurately with the local destruction.

When suppuration has taken place, and the bulk of the tongue is diminished by the natural or artificial evacuation of pus, and the distress of the system lessened by a freer state of respiration and circulation, a recovery may fairly be anticipated; but the proneness in this organ to the development of scirrhus, in constitutions predisposed to it, is a circumstance which the practitioner should be prepared to meet after this or any other excessive local irritation.

Treatment.—The rapid progress of idiopathic inflammation of the tongue, arising spontaneously in a subject previously in good health, and not induced by the action of poisons or mercury, renders it of great importance that the antiphlogistic regimen should be early adopted and actively pursued. Bleeding from a vein in the arm, in proportion to the excitement of the system, or from the external jugular vein when the brain is oppressed or likely to suffer, should be immediately resorted to, and repeated a second or even a third time, at intervals of eight or twelve hours, until the inflammatory action of the system be subdued; other means having been adopted in aid of the same intention. Leeches should be applied in considerable numbers to the tongue itself; and when the oozing of blood has subsided from their wounds, a piece of ice, or very cold water, should be frequently applied. Active purgatives, such as calomel and jalap, or sulphate of magnesia with infusion and tincture of senna, must be given without delay, and their operation aided by a stimulating enema: indeed to keep up the free action of the bowels, so essential in the treatment of this disease, a frequent repetition of this remedy will be necessary if purgatives cannot be swallowed; and, under more favourable circumstances, their counter-excitant action being immediate, they are calculated to prove highly advantageous. The usual diaphoretics and diuretics will be useful adjuvants in effecting the end in view; and, from the small bulk in which they may be given, digitalis and tartarized antimony are to be preferred. Immersion of the feet in hot water, or in some cases even a general hot-bath might be prescribed with advantage. A blister should be early applied across the throat, extending nearly round the inferior margin of the lower jaw, as far as its angles.

When respiration is so obstructed by the augmented bulk of the tongue that its increase or continuance threaten to impede it entirely, two or three deep scarifications must be immediately made from the base to its apex, taking care to avoid the *arteriæ raninæ*, for the means of suppressing excessive hemorrhage from them would probably excite a degree of irritation which would counterbalance the advantages consequent even to a moderate loss of blood.

Several instances of the advantage of incisions in extreme enlargements of the tongue

have been transmitted to us by M. de la Malle.* Camerarius has recorded a case in which the patient was rescued from impending death by this operation; and Zacutus Lusitanus, another of a child, ten years of age, where the usual remedies had failed of affording relief, and the symptoms yielded to deep scarifications. Job a Meekoen, a Dutch surgeon, who lived in the seventeenth century,† adopted this practice on several occasions with the most complete success; and it is probable, as Mr. Samuel Cooper has remarked, that a fatal issue from suffocation, consequent to various kinds of enlargement of the tongue, might in many instances have been averted by its timely adoption. In the twenty-eighth volume of the *Edinburgh Medical and Surgical Journal*, page 77, an interesting case of the disease is recorded, in which the free use of the scalpel was attended with the best effects; allowing an exit for puriform matter. In the twenty-first volume of the same work, page 235, there is another case, illustrative of the advantage of incisions of the tongue, in a case of its inflammation, apparently consequent to suppression of the menstrual discharge from exposure to cold.

It must be acknowledged, however, that incisions are not always successful; and it may be of importance to the practitioner's credit in proposing an operation which at least has the appearance of extreme severity, that he should advise it as essential in the urgency of the patient's circumstances, and the most conducive, though by no means a certain step to his recovery. An example of the inefficacy of this and several other therapeutic agents in a case which proved awfully rapid, terminating fatally within forty-eight hours from its commencement, was detailed in the second volume of the *Lancet* for the year 1827. It occurred in the Winchester Hospital, and had the advantage of the attendance of an eminent surgeon of that establishment in a little more than twelve hours after the earliest symptom of the disease.

If incisions should fail in producing the anticipated relief, there yet remains an alternative by which life may be sustained and an opportunity provided of conducting the disease to a favourable issue: we allude to the operation of bronchotomy, for the success of which in a case of this kind we have the recorded testimony of Mr. Benjamin Bell. The tongue had been alarmingly swollen from the excessive action of mercury, and no relief was obtained, although a variety of remedies had been used, until an opening was made into the trachea to keep up artificial respiration. With the same view Desault would have preferred the introduction of an elastic gum catheter from the nose into the trachea;‡ a method, we conceive, which the preternatural irritability of the parts in particular instances can alone render objectionable.

* *Mém. de l'Acad. de Chirurgie*, vol. v.

† *Dict. des Sciences Méd. Art. Glossite*.

‡ *Œuvres Chir. de Desault*, par Bichat, tom. ii. p. 406.

It will be inferred from our preceding remarks, (and the state of the patient will dispose him little to regret the privation,) that in the early stage of the disease, when the excitement is considerable, stimulating food and drink should be prohibited; it will also be necessary, of course, that the food should be in a soft state, and that both the food and drink should be cool, bland, and unirritating. In some instances the impediment to deglutition may be so great as to make it necessary to administer both medicine and food through the nose by means of a canula passed into the gullet; and, in circumstances requiring such a measure, nutritive injections may be had recourse to.

When the inflammatory stage of the disease has been subdued, and the tongue is assuming its natural appearance, little else will be necessary than care to avoid the direct application of irritating and acrid substances; and, if need be, the restoration to a healthy state by the remedial means severally proper in the particular conditions of those organs the defective actions of which may have served to promote the accession or violence of the disease.

When suppuration has taken place, or is about to do so, it will be necessary to relax in the pursuance of antiphlogistic measures, and, as soon as possible, to make a free aperture for the escape of pus, with a lancet or scalpel. From the observations we have already made on suppuration in this organ, it will be understood that a deep incision may often be necessary to reach the cavity of the abscess. A striking illustration of this has been recorded in the Glasgow Medical Journal, by Mr. Orgill, with other instructive cases of the disease. The patient, a farmer, fifty years of age, had suffered for some days from glossitis, and besides other treatment had undergone local bleeding by cupping and leeches, as well as two incisions *half an inch deep* from as far as the scalpel could be made to reach to the tip of the tongue. The incised wounds bled freely, and the swelling was a good deal reduced, but in the evening of the same day it became as great as ever; it was scarified still more deeply, and a castor-oil enema prescribed; this also gave great relief; but next morning the swelling had returned, with a peculiar lividity at the tip of the diseased half of the organ. An incision *an inch deep* was made with a scalpel, which gave exit to a gush of pus in a very offensive state, and in eight days the patient was well. The sensibility of the organ on the affected side remained imperfect for a year afterwards, but at length was restored.

When the tongue has been relieved of the painful distention occasioned by the impaction of pus, the sanatory quality of the saliva may generally be relied on for the completion of the process of cure. Astringents in most cases will be unnecessarily stimulating, but a simple admixture of honey and barley water, or some gargle equally unirritating, may contribute to the patient's comfort by diluting the saliva, and thus forming a cool and more bland

application. On some occasions it may be requisite to have recourse to other detergents, such as borax or tincture of myrrh in the common form of gargle.

The indications as to constitutional treatment in this stage are, to allay the irritability of the system, and to restore the disordered functions of the body to their healthy state. As the means must be selected on general principles, it would be needless to particularize them here.

When inflammation of the tongue has unfortunately terminated in gangrene,—a very rare occurrence in this rare form of disease,—its treatment is subject to the same laws as gangrene in any other part: reliance, however, is chiefly to be placed on the means of improving the condition of the constitution; though it is to be feared that in most instances there can be little probability of effecting this object. For the particular means we refer to the article *INFLAMMATION*, rather than occupy time and space unnecessarily by any formal detail on a subject which has little notice in the records of medical literature, probably because science has been unavailing in the few opportunities which have occurred for its application.

The enlargements of the tongue, (some extraordinary instances of which are on record,) which have been occasionally consequent to the exhibition of mercury, usually yield to purgatives, or injections of the same nature, bleedings, and the discontinuance of the mercurial medicine. In some cases of extreme obstinacy it may be requisite to make incisions into the organ, or to adopt the other means of treatment which have been proposed: other particulars relative to this state will be discussed under the article *PTYALISM*.

In those tumefied states of the tongue which occur in typhoid and variolous fevers attended with an atonic condition of the system, the local affection requires little consideration apart from the general disease, unless, indeed, the magnitude of the organ should threaten suffocation; when free incisions, in the manner we have already described, and the other mechanical means pointed out, may materially relieve, if not save the patient from impending death.

In such instances as are the results of metastasis, as of gout or rheumatism, the first step will be to invite the inflammation to its original seat, by applying to the latter a sinapism or blister, or by immersion of the extremity in which it may have been situated in hot water, rendered still more stimulating by the addition of flour of mustard or common salt: should this fail in producing the desired effect, or if the habit of the individual should be favorable to the continuance of inflammation, the method of subduing it must be adopted at the same time, bearing in mind that under such circumstances the local affection will partake of the same peculiarities, and require a corresponding consideration, with the general disorder.

(W. Kerr.)

GLOTTIS, SPASM OF THE. This very formidable affection, which is by no means of rare occurrence in infancy, was till of late years but ill understood, being for the most part confounded with croup and other inflammatory affections of the air-passages. One of the first obscure notions of it is that by Millar, under the name of the acute asthma of infants. He seems, in some respects, to have confounded it with the first stage of croup; and yet, if early discovered, he thought it might always be cured by the plentiful exhibition of assafetida, and the subsequent employment of bark.

A further step towards the diagnosis of the disease was made by Underwood, in his division of croup into the chronic or spasmodic and the acute or inflammatory. The former of these, which seems to answer to what is now called spasm of the glottis, he states to have been known to continue so long as two months, and then to have yielded to opium. "Instances have likewise been met with of children crouping for two or three days, and being then seized with whooping-cough, which has instantly removed the croup. These circumstances," he continues, "seem to prove that species of croup to be truly spasmodic. I have seen it frequently in this form attend the cutting of teeth, being then the mere consequence of irritation, as we see cough and various other symptomatic affections induced at this period." In addition to assafetida and bark, Underwood recommends the occasional use of emetics and cicuta—"one or other of which must be persevered in as long as any symptom of the disease, and particularly the croaking noise, shall remain." He seems, however, to have had but a very imperfect notion of the disorder, confounding it in one part of his work with croup, with which it has really no affinity, the membrane lining the larynx presenting no traces of disease on dissection; and treating of it in another place under the head of inward fits, which is an imaginary disease. Dr. Ferriar, likewise, in recognizing a spurious species of croup, seems to have met with the affection in question, though he did not attain to a correct idea of its nature.

One of the first accurate accounts of the disease is that by Dr. John Clarke, in his Commentaries on the Diseases of Children. He describes it under the name of "a peculiar species of convulsion in infant children," often misnamed spasmodic or chronic croup. The child, according to this writer, is suddenly seized with a spasmodic inspiration, consisting of distinct attempts to fill the chest, between each of which a squeaking noise is often made; the eyes are staring, and the child is evidently in great distress. The face and extremities, if the paroxysm continue long, become purple; the head is thrown back and the spine bent, as in opisthotonos; at length a strong inspiration takes place, a fit of crying generally succeeds, and the patient, much exhausted, falls asleep. The paroxysm may occur often in the course of the day, and is most apt to take place on awaking, or on exposure to slight causes of irritation. If neglected, it may go on recurring frequently for two or three months, until at

length general convulsions ensuing, the parents become alarmed. It seldom occurs, he thinks, after the third year, or in children who have lived by suckling alone till they have got some of their teeth, and thus escaped those derangements of the health which are connected with an unsuitable diet in extreme infancy. This, as well as other convulsive affections of children, he ascribes to disease of the brain, which may be induced, he thinks, by overfeeding, keeping the head too hot, the sudden cure of ophthalmia, or of cutaneous eruptions, the occurrence of fevers, &c. In one fatal case he discovered, on dissection, both fulness in the vessels of the brain and water in the ventricles.

A peculiar species of hydrocephalus, ushered in by spasm of the glottis, has been mentioned by Monro; and a case which seems to have been of this kind is also alluded to by Underwood. Gölis, in treating of the predisposing causes of hydrocephalus, places this affection amongst them, and describes it as "a peculiar disorder of respiration, in which infants after sudden waking out of sleep, or from terror or anger, often too without any cause, are suddenly seized with a deep shrill respiration, which for many seconds, sometimes even for minutes, threatens suffocation; the whole body becomes stiff; the face, hands, feet, and particularly the finger and toe-nails black or blue, and the little patients lose their breath and consciousness; at length, however, with a cry of alarm they again recover both."

Dr. Cheyne has given, in the following passage from his work on hydrocephalus, a more satisfactory account of this affection, since called spasm of the glottis, than any of his predecessors:—"Another disease of infancy requires to be briefly adverted to in treating of the diagnosis of hydrocephalus. This disease has been known to some authors under the titles of inward fits, chronic croup, &c. It begins with a crowing inspiration, like that which takes place in the commencement of a paroxysm of pertussis. As at first there are long intervals between these spasmodic inspirations, (several days perhaps;) as they appear to be connected with a disordered stomach and absence of bile in the bowels; to arise from sudden exertion, or fits of passion; and as the child often continues to thrive notwithstanding, the disease is not much attended to. At last, however, the spasmodic inspirations excite just alarm; they occur frequently without any apparent cause, when the child is perfectly tranquil; the complexion becomes purple, insensibility follows, and not unfrequently universal convulsions or rigidity of the muscles, with the thumbs clenched in the hands: these convulsions, in seven instances to my knowledge, have ended in death. However, after continuing many weeks, or even months, this affection often terminates favourably with the cutting of one or more of the teeth, or it may be relieved by effectually scarifying the gums, changing the air and diet, and alternating mercurials with carminative purgatives. The pathognomick of this disease is a crowing inspiration with purple complexion, *not followed by cough*. In some cases this affection is attended not

merely with a permanent clenching of the hand upon the thumb, but also with a very remarkable fixed spasm of the toes, particularly the great toe, which gives a look of swelled deformity to the upper part of the foot." For a further account of this peculiar swelling of the hands and feet, first accurately described by Dr. Kellie, the reader is referred to the article DENTITION, DISEASES OF.

Spasm of the glottis cannot be considered a rare disease, as Cheyne had seen previous to the year 1819, when his work was published, no less than twenty cases, of which one-third were fatal. He, like Clarke, has no doubt that the brain is the seat of the disease; but what is the precise morbid condition of this organ giving rise to these peculiar symptoms, or whether there be any invariable one, has not yet been accurately made out. The results of dissection in three cases are given in the appendix to his work. In the first of these, two tumours, apparently of a scrofulous nature, were found imbedded in the substance of the brain; in the second, the convolutions were nearly obliterated, and the cerebral substance appeared uncommonly firm; in the third, the veins on the surface of the brain were turgid with blood; a considerable quantity of serous fluid existed between the tunica arachnoides and the pia mater, giving a gelatinous appearance to the surface of the hemispheres; whilst about an ounce of water was discovered in the ventricles. Disease of the brain has not, however, always been detected. Thus in two cases mentioned by Dr. Meriman, of children who died in these fits, no appearance of cerebral affection could be discovered. The principal deranged structure was a collection of small glandular swellings in the neck pressing upon the *par vagum*. In none of these cases was there any trace of inflammation in the larynx or trachea.

Gardien's description of this affection, under the title of "*Spasme du Thorax & de la Glotte*," differs in some respects from most other accounts of it. He remarks on the impropriety of many of the names which have been bestowed on it. Thus by Lieutaud and Baumes, who seem to have had a pretty accurate idea of its true nature, and its alliance to convulsive or nervous affections, it has been absurdly called "*catarrhe suffocante*." The appellations of "*acute asthma of children*," employed by Millar, or spasmodic asthma, used by Rush, appear to him equally objectionable. The disorder, as described by Gardien, consists in a spasm of the diaphragm, muscles of the chest and larynx, and is, he thinks, almost always fatal, if suitable remedies be not employed during the commencement of the disorder. It occurs chiefly in children, though in some rare instances it has been observed in adults also, chiefly in nervous women and old persons. The night-mare, or a habit of suddenly awaking from sleep in a state of terror, he looks upon as a premonitory symptom, or as the first stage of the disease. Children who are liable to it are observed to cry very frequently during the day, and are frightened and agitated by the slightest causes. Its

attacks are sudden, and occur chiefly in the night. The appearance of the face during the continuance of the spasm is variable; in some instances being pale as in syncope, whilst in others it has an apoplectic character. It occurs most frequently, he thinks, between two years old and seven; in which he differs from most other writers, as it is usually placed amongst the diseases of early infancy and of dentition. Children who are old enough to explain their sensations complain of a feeling of suffocation and constriction about the chest, as if it were bound with cords, and of palpitations and convulsive efforts of the thorax, with a sense of strangling about the larynx; the respiration is sometimes momentarily interrupted, and is at all times extremely difficult, and accompanied with a peculiar sound, which can be heard at a considerable distance. The stomach and intestines are distended with air, and the patient seems as if he would die of suffocation, if eructations or vomiting did not come to his relief. His description in some of its parts suggests to us the idea of an hysterical affection. Spasm of the glottis, as already stated, has also been mentioned by Dr. Merriman. He thinks it by no means an uncommon affection of children, and attributes it chiefly to improper food and close and confined apartments.

Wichmann, the Hanoverian physician, and Schmalz, in his work on diagnosis, have taken peculiar pains to point out the distinctions which exist between this disease and croup. The latter seems usually to depend on a cold damp air and sudden atmospheric vicissitudes; its inflammatory nature is manifested as well in the character of its symptoms, as by the beneficial effects of antiphlogistic treatment, and by the appearances on dissection. Spasm of the glottis, on the contrary, is excited by passions of the mind and other sources of momentary irritation, existing often in distant parts of the body; catarrhal symptoms form no essential part of the disease; it occurs chiefly in those who have a general disposition to convulsive affections; its attacks are intermittent, and are most susceptible of relief from agents acting on the nervous system; and it presents after death no traces of inflammation in the respiratory organs.

Spasm of the glottis has been described by Mr. Pretty in the Medical and Physical Journal under the singular name of cerebral croup. It has also been noticed by Richter, Henke, Jahn, and several other writers in Germany; and in France it has been treated of by Guersent under the title of "*pseudo-croup nerveux*." Though it has been thus recognized by so many respectable authorities as a distinct and well characterized disease, yet Autenreith and Hecker, and more recently Jurine and Albers, have treated it as a mere modification of croup. From this, however, we repeat, it is broadly distinguished, as well by its intermittent nature as by the usual absence of cough and fever, and by the sudden death which not unfrequently occurs in it. Even if a slight cough happens to co-exist, the disease may still, as Dr. Hamilton has remarked, be satisfactorily distinguished by the cough not being

a peculiarly hoarse one; and by the breathing in the intervals remaining perfectly free.

The latest and by much the best account of the disease, is that by Dr. Marsh. The disorder as described by this writer begins by the muscles of the glottis; but if neglected or mismanaged, it may extend to those of the extremities, and even terminate in universal convulsions. Its occurrence is by no means rare, and its result not unfrequently fatal. It sometimes appears to be a purely idiopathic affection; but in far the greater number of cases, as Dr. Marsh observes, "it is complicated with painful dentition, derangement of the digestive functions, a cachectic state of the system induced by an impure atmosphere, fever, and occasionally with effusion into the ventricles of the brain. The child is observed to awake suddenly from sleep in a state of alarm and agitation, to struggle for breath, and, after repeated efforts, to recover from the paroxysm with a long and sonorous inspiration," usually described by nurses as a whoop or crowing sound. The face is swollen and purplish during the fit. As the disease advances, similar attacks occur even while the child is awake,—“sometimes without any perceptible cause, but more frequently when it is vexed and about to cry.” Robust as well as delicate children are liable to it, but it especially attacks those which are of a passionate and irritable disposition, and the subjects of it are observed to be easily startled even by the slightest noises. It is only in its more advanced stage that Dr. Marsh has observed the peculiar swollen state of the hands and feet, and the rigid contraction of the thumbs and toes already alluded to.

In the treatment of the disease the chief indications consist in removing any complications which may exist, and in improving the general health, and especially the tone of the nervous system. Difficult dentition is a very frequent exciting cause of this affection: when it is suspected to have this origin, the swollen gums must be immediately divided. In those cases where a careful investigation into the state of all the functions of the body detects no complication, a mildly tonic plan of treatment should be had recourse to. The sulphate of quinine, or some of the mineral tonics, are here found very useful. Antispasmodics too often disappoint expectation, and are of very secondary importance in the treatment of the disease: ether and ammonia are the only medicines of this class in which Dr. Clarke had the slightest confidence. The tinctura fuliginis of the older pharmacopœias is spoken of by Dr. Marsh with some commendation. In all cases we should endeavour to improve the general health and strengthen the nervous system by country air, a well regulated diet, and attention to the state of the bowels. By giving the child the advantage of a pure air and of a succession of good nurses during the whole period of dentition, more good has appeared to be done than by all other measures put together. Dr. Marsh remarks that all his cases occurred in children of a scrofulous con-

stitution; a fact which leads him to insist still more strongly on the importance of a pure atmosphere, healthy nutriment, and tonics. Dr. Cheyne, also, as we have seen, dwells much on the utility of change of air and of diet. Free exposure to the open air, and daily sponging the body with cold water, are amongst the most effectual means we possess for lowering the nervous excitability in this and many other spasmodic disorders.

When the convulsions threaten to become general, leeching the temples, cold applications to the head, and fomentation of the extremities, will generally be required. In the case of a delicate child of two years old, mentioned by Marsh, in which the paroxysms were of very frequent occurrence, and were accompanied by general convulsions, a tobacco enema (five grains infused in six ounces of water) was administered; it produced its specific effect in a very marked manner, and no appearance of convulsions was observed for a month after. Removal to the country appeared to confirm the cure. The symptoms, however, recurred on again returning to town to a house which had been recently painted. Several other instances are mentioned, where the disease seems to have been excited by the unhealthy atmosphere of newly painted rooms.

Dr. Merriman is of opinion that this disease, when early attended to, will commonly yield to aperients, so given as to procure at least two copious evacuations daily, together with the continued use of soda, or a strong infusion of burnt sponge, and proper attention to the diet and regimen:—"When the head is manifestly affected, cupping-glasses behind the ears are required; but when the patient has cold, pale, flabby cheeks, abstraction of blood is rather injurious than beneficial." Dr. Hamilton has found Dalby's carminative a useful medicine in this affection after the bowels have first been freely opened. We have known the disorder, after resisting the influence of purgatives and change of air, cease finally on the occurrence of a spontaneous diarrhœa.

Spasm of the glottis has occasionally been mistaken for an inflammatory affection of the lungs or air-passages, and been much exasperated by a consequent perseverance in the antiphlogistic treatment, and by confinement to the close air of a heated apartment. Even in its simplest and mildest form it should never be neglected, as, in the absence of every complication, the spasm of the muscles of the larynx alone has often proved suddenly fatal. Dr. Johnson knew a case recovered by the immediate employment of artificial respiration, after death had apparently taken place.

Before terminating this article, we may state that fatal spasm of the glottis in adults occasionally takes place, under the influence of irritating causes in the neighbourhood of the larynx. Thus, in an interesting case recorded by Mr. Kirby, spasm of the glottis and death were caused by the irritation of a mouthful of food sticking in the œsophagus; and we have seen a patient with many of the symptoms of acute laryngitis die rather unexpectedly,

when, on dissection, very little if any redness or swelling were discovered in the membrane lining the larynx, and scarcely any other morbid appearance than one or two minute ulcers. It is probable that the fatal result, as well as the sonorous breathing, and many of the other symptoms in such cases, depend on a spasmodic contraction of the glottis.

(W. B. Joy.)

GOUT, *gutta, la goutte*, a drop or defluxion. A name is of slight importance, provided it does not mislead by imputing to a disease a hypothetical character. If used only to express the individuality assigned, for purposes of convenience, to an aggregate of functional disturbances or structural lesions, and limited to this sense without involving any speculative conjectures respecting the cause or nature of disease, it need not be rigidly criticised. That which heads the present article, while it is one of the most ancient, being traceable so far back as the thirteenth century, and the most generally adopted, a corresponding term having found its way into all the languages of Europe, is also the one in common use to designate the disease; and as the false theory which gave rise to it has been long exploded, and is now incapable of biasing any one's judgment, it seems little worth while to change it for any other, especially as, of the substitutes introduced or proposed, none is so unexceptionable as to entitle it to a preference.

An elaborate treatise on gout would be unsuitable to the present purpose, while it would be valueless if it could be introduced. To record all that has been said in the lapse of centuries would be a wearisome labour to the writer, and profitless to the reader. Much has been written which may well be passed over. The facts are few, the speculations many, and these too often the mere phantasms of the brain. The former are the same now that they ever were, and therefore cognizable by every observer; and far better is it to study them in the book of nature than to take them on trust from any authority, however high: the latter have produced but little worth remembering; theories have chased each other like shadows in a magic lantern, none abiding to announce to us the essential nature of gout. After ages of enquiry, we know it only by the order and character of its phenomena, and have yet to learn its intimate nature or the special cause which produces it. Happily the knowledge within our reach is sufficient to guide us to much useful practice, as well in averting accessions of the malady as in mitigating them when they do occur, and in preventing the disorganization and decrepitude to which gout, when neglected or maltreated, so often consigns its miserable victims. If, from our inability to penetrate nature in her inmost recesses, we cannot detect the essence of gout, we can at least note the succession and character of the phenomena which constitute it; we can mark the deviations from health which precede and attend the attack,

and, by contrasting them with the healthy condition, can arrive at some knowledge of what is amiss: we can thus direct our efforts to restoring healthy function where this is sensibly impaired, and by so doing can second the efforts of nature in remedying the special disorder, even when ignorant of what essentially produces it. In fine, by adopting a pathology founded solely on facts unalloyed by hypotheses, and conformable to all that we know of the physiology of animal life, we may establish a system of treatment supported by rational principles, and capable of rendering much valuable service to those who need our assistance, and look to us for relief.

We have it in our power in a great degree to avert the accession of the gouty paroxysm by correcting that state of the constitution which ministers to it; we can greatly mitigate the sufferings of the attack, abridge its duration, and prolong the period of exemption; by so doing we can prevent those horrid disorganizations which protracted or oft renewed gout so constantly occasions, and also obviate still more fatal consequences which result when gouty action extends to vital organs and other parts essential to well being. The brain, lungs, heart, stomach, liver, kidneys, may any or all participate in the derangements occasioned by unrelieved or maltreated gout; and the sufferings and danger which thence result may be numbered among the most formidable to which disease can subject the animal frame. Palsy, epilepsy, gravel, and other direful infictions are too often the attendants on protracted gout, and intensely do they aggravate its sufferings. These views are hastily sketched, for the purpose, not of magnifying the disease or attaching to it an undue importance, but of claiming for it that scrutinising investigation, vigilant observation, and sober judgment which may bring its practical treatment within the pale of rational principles, and divest the subject of the mysticism which has been too long suffered to surround it, to the discredit of medical science and the encouragement of charlatany.

On no subject has empiricism been more assiduously or more mischievously pursued; and where its nostrums have not proved absurd from their inertness, they have been too often pernicious from their activity: witness the numberless victims who fell a sacrifice to the delusive efficacy of the *eau medicinale*. Until the treatment of gout shall be established on the same principles which are found applicable to all other diseases; until the contemplation of its inscrutable, or at least undiscovered, essence shall be superseded by a fixed attention to its obvious and intelligible phenomena, and the proper treatment which these demand be adopted generally and systematically by the profession, quackery will continue to practice its deceptions, and gouty sufferers, hopeless of relief from the regular practitioner, to surrender themselves the willing dupes of every confident pretender.

A history of gout that would comprise all its alleged forms and modifications would be both tedious and uninteresting; nay, instead

of elucidating, it would but obscure the subject, involving it in inextricable confusion. Much that has been attributed to gout belongs not to the special disease so much as to incidental derangements, either antecedent to, coincident with, or resulting from it, and no more an integrant part of gout than when they occur in connexion with any other malady. The incidental derangements of a gouty habit are numerous enough, and often to be met with; but it can serve no good purpose to represent all these as characteristic of gout, which, on the contrary, will be best and most clearly comprehended when viewed in its natural form, divested of those complications which, however occasionally intermixed, do not necessarily belong to it. It has been too much the custom to attribute every morbid action occurring in a gouty habit to the influence of gout; and, however obvious their nature or character, to render their treatment subservient to the notions of gout which the medical attendant chanced to entertain. In this way have the apprehension of debility, the belief of a tonic treatment being requisite in gout, and the fear of injuring the constitution by any interference with the gouty paroxysm, misled many into pursuing a stimulant regimen under circumstances which, but for this delusion, would have been seen to indicate a very opposite course; and to the conflicting experience derived from observations made under such misconceptions, may be ascribed much of the uncertainty and caprice which mark the treatment of gout, both popular and professional, even at the present day.

The best history of gout for all useful purposes must be that which represents the disease in its simplest form, giving such a description as will enable the young practitioner to recognise it when presented to his view. This being illustrated, and the principles of treatment explained, the various modifications may then be advantageously discussed in connexion with the derangements which occasion them, and with the treatment which they respectively require; in which course of enquiry it cannot fail to be remarked how much this treatment is dependent on the same general principles which guide the practice in all other diseases, and how very little consideration it admits for the special nature or character of gout.

The definition of Cullen characterises the disease clearly and succinctly. "*Morbus hereditarius, oriens sine causa externa evidente, sed præeunte plerumque ventriculi affectione insolita, pyrexia, dolor ad articulum, et plerumque pedis pollice, certe pedum et manuum juncturis potissimum infestus, per intervalla revertens, et sæpe cum ventriculi et aliarum internarum partium affectionibus alternans.*" That this as a definition is open to objections we admit. As a description of the disease, however, at once concise and correct, it seems to answer every purpose; and we are not aware of any preferable or less exceptionable character of the malady having been yet proposed. The object of a definition is so to

characterise a disease that the name used to denote it shall be applied always to the same morbid condition. But it is a general character only that can be thus assigned. Perfect accuracy is not within the compass of any definition; and it is fruitless to cavil at imperfections of nosology, when of the branch of science which classifies disease the very foundations are yet undetermined. It may be confidently alleged that of all the methodic classifications yet proposed, not one rests on a stable basis; and both physiology and pathology must be greatly advanced ere any arrangement bordering on a natural and scientific classification of diseases can be practicable. The derangements of the constitution which usher in diseases, the local disturbance to which they give rise, and the reaction by which these aggravate and complete the disordered state in which they originate, are too little understood for any classification of diseases founded on their essential nature or character to be yet attempted. To the labours of the pathological anatomists now so diligently pursued, and to the lights which these shed on morbid actions, and the lesions which result from them, must we look for guidance in this respect if the object is ever to be attained. So unsettled are opinions respecting diseases of the most frequent and extensive occurrence, that it is yet disputed whether fever is a local or constitutional disease; and this ambiguity is likely to endure so long as consideration of diseased conditions of the frame is taken up at the advanced period at which a nosological disease presents itself, without sufficient regard being had to the previous deterioration of health to which so many of these morbid conditions are traceable, and without a clear knowledge of which their nature and progress never can be thoroughly understood.

Much of the complexity displayed in any minute history of gout results from several circumstances being comprised which do not essentially belong to it. Left as it has been to work out its own cure, derangements have ensued in its unchecked progress, which a more efficient treatment of the incipient disease would have wholly prevented, and which should, therefore, be considered rather as contingent and derivative than as forming a primary or essential part of the malady. Peculiarity of constitution, too, whether natural or acquired, continually varies the aspect of the disease; and here to discriminate what is truly gouty from what is but casual is surely preferable to confounding the whole assemblage of symptoms by representing them as all characteristic of gout. The best mode of imparting just and clear ideas on the subject seems to be, to discuss first the disease in its simplest form; and having illustrated, so far as our knowledge permits, its nature and treatment, to extend enquiry to those complications which protracted malady or peculiarity of constitution occasion, instead of regarding these as distinct and peculiar varieties; in which course of investigation the several mo-

difications distinguished as atonic, retrocedent, and misplaced gout, will be necessarily included.

Histories of gout have been rendered with a minuteness of detail highly creditable to those by whose patient observation and faithful delineation they have been supplied. So copious has been the record of symptoms, whether antecedent to, accompanying, or consequent on a paroxysm, that there is scarcely a derangement of the frame which has not at one time or other been noticed and included. It is full time to lay aside this tedious and profitless minuteness,—to classify those individual symptoms according to the functional derangements which they indicate,—to ascend from the manifestations to the causes which produce them, tracing to the disordered functions the several symptoms which denote their disturbance,—to look to the nature and character of such disturbances, and their connexion with the disordered functions, as the only real source of useful knowledge, the only sure guide to rational or effectual practice in this or any other disease,—to distinguish what really belongs to the disease from mere contingencies, dependent not on the specific cause of gout, but on deviations from health local or constitutional which have no necessary connexion with it, and which require to be treated precisely as if they occurred independently or in connexion with any other malady. Divested of this source of confusion and obscurity, gout becomes as intelligible as are many diseases with which we consider ourselves better acquainted; and though after all our investigations the influencing cause of its peculiar and distinctive character is still a mystery, we may attain quite as intimate a knowledge of its pathology, as far as regards practical utility, as we possess of small-pox, rheumatism, or any other disease of the intimate nature of which we are ignorant, and which we are content to know only through the medium of the constitutional and local disturbances which mark their accession and progress.

In this view a paroxysm of gout can be regarded only as a constitutional disturbance of an inflammatory character, attended with local inflammation of a peculiar kind in one or more joints, running a determinate course, and in the earlier accessions terminating in health, for the most part within a very few days. Such being the character of simple gout, there is no reason why the complications so much dwelt on should be considered as specially belonging to it, or regarded otherwise than as accidents arising from peculiarity of constitution, contingent derangements of health, or the lesions or morbid tendencies entailed by preceding accessions.

That the paroxysm of gout manifests invariably an inflammatory character is a truth which all admit. The inflammation both local and constitutional occurs in every variety of degree; still an inflammatory character marks the whole. In consequence of the disease being identified with the local inflammation, and supposed to commence only when this appears, the seizure is generally represented as

taking place suddenly, the previous good health being gratuitously assumed. This, however, is a great fallacy, no disease evincing so much constitutional disturbance or local inflammation, arising from a cause acknowledged to exist within the body itself, being ever of sudden occurrence. Ample warnings of the approach always exist, and would admit of ready detection, but that the parties, unsuspicious of what is pending, or thinking lightly of the unhealthy deviations, overlook or disregard them; and as medical aid is not sought until the accession of the paroxysm, the premonitory indications are rarely submitted to the observation of the medical practitioner: whence a stage of the disease of the first importance, and that which is calculated to throw light on all the subsequent changes, has not received that scrutiny to which it is eminently entitled, nor been allowed the share which it ought to have, both in determining the true pathology of gout, and establishing the practice best suited to its relief.

In the active gout of robust habits, the plethoric state of constitution attendant has been too conspicuous to be overlooked, and accordingly it has received its full share of attention, although the indications of treatment which it presented have not always been acted on to the extent which they ought. It is of importance to understand that in cases where plethora is less obvious, its existence is not the less real nor the less entitled to the practitioner's serious attention. The subject of plethora, its intrinsic nature, modifications, and phenomena, is too extensive to be introduced in this place, a separate discussion being required to elucidate it, which will be found under its proper head. So connected, however, is plethora with gout, that a brief notice of its pathology becomes a necessary introduction to the further consideration of this disease.

The elements of nutrition being supplied to every part of the body by the blood, and this deriving its nutritive matter from the aliment taken, it is obvious that redundancy of nutritive matter may take place in the blood, either from sustenance being inordinately taken, or from a diminished expenditure of it in the ordinary appropriations. In either case the healthy proportions of the elements of which blood consists are altered, and a corresponding effect is produced on the several processes to which the blood is subservient. An accurate investigation of the actions and changes thus induced would go far to explain the origin and progress of many diseases. They should be traced, not by speculative conjectures of what might be ingeniously supposed to take place, but by carefully noting the phenomena which indicate them, and, by induction from well-ascertained facts, guided by a sound physiology, ascending to that point which connects the state of health with the morbid changes. These phenomena have been much overlooked or misconceived, and the semblance of debility which they present has been the source of much bad practice.

The plethora of a healthy and vigorous habit is familiar to all, is readily acknowledged, and seldom misunderstood. That which arises in habits more weakly by nature or depraved by vitiating influences, is less known, and its appropriate phenomena are more liable to mislead. When fulness of habit arising from redundant nutriment takes place in a healthy constitution, its earliest effects display what may be termed exuberance of health rather than a state of disease. The several functions of the body are more vigorously performed, the nutrition of its several structures is more abundant, and it acquires increase of bulk, especially if the habits of life are not of an activity capable of rendering the appropriation of blood in the several secretions commensurate with the nutriment inordinately supplied. Though this state cannot well be denominated disease, it yet approaches very nearly to the confines, as is continually exemplified in instances where acute diseases of formidable intensity assail persons considered as being antecedently in unusually good health. If the excess be casual or inconsiderable, the self-adjusting powers of the body are amply sufficient to dispose of it so as to prevent the accession of actual disease. And this is done simply by the stimulus of the too nutritive blood exciting the several secretories and excretories to an increased exercise of their several functions. But when, from extent or continuance, the excess is such as to urge these powers beyond a certain point, then these corrective energies fail, and irregular actions and distributions of blood take place, laying the foundation of a large proportion of the special diseases to which the human body is liable. The general character of the diseases thus induced is congestive or inflammatory; by depletion and abstinence the disturbing cause is corrected, and, thus relieved, the natural powers of the constitution soon re-establish a state of health. The more early such relief is afforded, the more prompt and effectual will it be, and the more certainly will those lesions and derangements be averted which protracted plethora is sure sooner or later to occasion. But to relieve it thus early so as to obtain these advantages, it is necessary to be able to recognise its existence by those evidences which denote it, antecedently to the stage of excitement known to us as fever or inflammation. These evidences present an equivocal character to those who have not closely observed the rise and progress of plethora, and they are continually misconceived as rather indicating a state of debility requiring support from nutriment and stimulants, than as calling for abstinence and depletion. When plethora (by which is to be understood not a mere redundancy in the quantity of the blood, but an excess in the proportion of the elements, chiefly the gluten, which supply nutritive matter to the several tissues) increases so as to exceed what the excited energies of the frame can healthfully dispose of, these energies, incapable of sustained over-exertion, become weakened, and a condition results which is very liable to be

confounded with pure debility. The pulse becomes low, oppressed, irregular, and a state of general languor is experienced. Sooner or later this condition passes into one of permanently increased action of the bloodvessels, attended with additional phenomena, the assemblage of which constitutes that state to which we apply the terms fever and inflammation. For the full consideration of this subject we must refer to the article PLETHORA, as it would encumber too much the present essay. Some notice of it in this place was indispensable from its connexion with gout, and the necessity of referring to it both in elucidating the character and progress of the disease, and in establishing the principles on which the treatment should be conducted.

A paroxysm of gout is seen to consist of a peculiar constitutional disturbance terminating in a local inflammation, the occurrence of which latter, so far as the simple paroxysm is concerned, seems the natural remedy of the preceding disturbance. If the various derangements which usher in an attack of gout, instead of being promiscuously enumerated with a minuteness and to an extent which confound all clear conception, were classed according to the functions severally depraved, the representation would be much more simple and intelligible. All of them admit of being traced to lesions of the circulation, alimentary canal, the nervous system, and the several secretory and excretory organs. Pursuing the inquiry, it is not difficult to mark the connexion of these with each other, or to detect the primary derangement in which they have their origin. Excess of nutritive matter in the blood, whether absolute or relative, has been seen to disturb the circulation, occasioning, first, a high activity of healthy function; secondly, an interval of diminished energy; and, lastly, a state of permanent excitement. By absolute excess is meant that which would be excessive in the most healthy state of the individual constitution, and which is always the result of inordinate nutrition; by relative, that which, though it might not exceed what a state of health with active exercise might safely endure, is yet relatively redundant when health has from any cause declined, or when from defect of wholesome exercise, the healthful appropriation has been more or less impeded. Under all these states of vascular action the several secretory and excretory functions become first excited and afterwards more or less depraved, and nervous affections of various kinds ensue, produced either by irritation of the splanchnic nerves, giving rise to endless sympathies, or by disturbance of the brain itself, occasioned either by too rapid circulation, or by remora of blood within it. The series of phenomena here noticed may be traced with considerable precision and in the ordinary succession, although, so far as regards the nervous derangements, these admit of considerable variation. The best proof of the correctness of these views is to be found in the efficacy of the practice to which they lead.

It is this plethoric state of constitution that

invariably leads to the accession of gout, and the premonitory signs of the approaching paroxysm may always be detected by those who seek them in the derangements of function which indicate a state of plethora. These could not have been so long considered as questionable were it not for the delusive appearance which some of the phenomena present, the suspicion of debility which they arouse, and the timidity of the class of patients most subject to gout, which, shrinking from all active treatment, and clinging to accustomed indulgences, has in all ages, even the present, biased the judgments of practitioners; who, even when they see the right mode of treating gout, are unable to pursue it, and compelled to follow the established routine, however inert or mischievous, until from never witnessing the salutary effects of simple and direct treatment, they lose sight of its advantages, and at length cease to be conscious of any such being attainable.

A state of plethora, absolute or relative, precedes every accession of gout, and is the principal if not immediate cause of it. The intensity and duration of the paroxysm, too, are dependent on the degree of plethora prevailing, although other circumstances may contribute to prolong the attack. But, notwithstanding this, gout is not simply plethora leading to or ending in local inflammation. There is something more from which gout derives its distinctive character, and this ideal, at least unexplained existence it is which constitutes the essence of gout. As we are utterly ignorant of it, save through the modifications of inflammation which it produces, our best and safest course, so long as this ignorance continues, is to pay no regard to it farther than to observe the phenomena which denote its existence; to mark their order and succession, with the deviations from the ordinary course of inflammation which they display; and to preserve our practical procedures free from any influences derived from mere speculations of this unknown cause, however ingenious, resting them solely on well established facts and enlightened experience.

In simple gout we know of no good reason why the treatment applicable to the same degree of general fever and local inflammation occurring from other causes should not be employed. Its general safety and efficacy we can faithfully attest, nor are we aware of any peculiar caution being required beyond what the accompanying state of constitution and the attendant symptoms must necessarily suggest. In all diseases, however inflammatory, the state of constitution requires to be taken into account in judging the activity of practice that may be safely ventured on; and the same consideration is needed in gout, but assuredly none is due in this respect to the imputed essence of gout, nor to the apprehension of interfering with it which has been too long suffered to paralyze the efforts of the practitioner in contending with this hitherto unconquerable foe.

The constitutional disturbance which ushers in gout leads to a local inflammation, after the occurrence of which the constitutional derange-

ments subside. As this inflammation in the earlier accessions quickly subsides, leaving the parts affected unimpaired, it is fair to consider it the crisis of the malady, and also its natural cure; though how it accomplishes this cure is a mystery which we are unable to solve. And were the disease to end here, the interference of art would be superfluous and improper; but it is far otherwise: renewed plethora leads to successive attacks; these progressively increase in intensity, duration, and extent of ravage; and woful experience amply proves that the mere efforts of nature, unaided by regimen, are quite incapable of extinguishing gout. Whenever gout occurs, therefore, it is always expedient so to assist nature as to accomplish more than her unaided efforts are capable of performing, both in rendering the attack milder and the recovery more perfect. The more speedily the constitutional disturbance is corrected, the less is the risk incurred of the gouty diathesis becoming confirmed, and the greater the security against the derivative ailments entailed by protracted or oft renewed gout; the sooner the local inflammation is subdued, the less will be the ravages made in the structure of the inflamed joints, and consequently the less the liability to that decrepitude which rigidity of joints, whether arising from thickened ligaments, effusion into the bursæ, or the deposit of solid concretions, occasions.

The gouty paroxysm, involving as it does a state of constitutional plethora, attended with local inflammation, and a latent influence directing and modifying that inflammation, must always be contemplated in its compound character; but so far as practice is concerned, this must be regulated by reference to the inflammatory state, which is fully within our comprehension, rather than to the latent influence, of which we know nothing. The former, with sure and steady light, directs us safely on our way; the latter is much too indistinctly seen to afford us any guidance. If the first attack of gout were treated with due activity, as an accession so decidedly inflammatory would assuredly be were it not for the prejudices so long and so pertinaciously maintained, and if the diet and regimen were afterwards regulated as the tendencies of the constitution and the degree of the gouty diathesis would demand, the future ravages of the malady would be slight indeed, and its victims few. To disregard of the real nature of the malady, to timidity and inefficient treatment of it when it first occurs, and to the pernicious effects of ease and luxurious indulgence in the intervals, when active exercise and abstemious regimen afford the only means of counteracting the morbid tendencies that exist, may be traced all those horrid disorganizations and broken constitutions which have rendered gout the opprobrium of medical science.

As two elements concur in the formation of gout, the plethoric state and the unknown influence, it is clear that these may combine in every variety of proportion, and that the results will be conformable to the degree in which either may prevail. Where the gouty predis-

position is strong, a slight degree of plethora will suffice to call it into activity; where the plethora is inordinate, a slight degree of gouty diathesis will give that direction and character to inflammatory action which will identify it with gout. In either case it is the plethora and inflammatory state which chiefly claim the practitioner's attention, and to which his remedies can be most beneficially directed,—with this difference, that in proportion as the diathesis, whether hereditary or acquired, is strongly marked, should the means corrective of plethora and inflammation be assiduously and perseveringly employed, within those limits which a sound discretion would enjoin. In the distinction, so much insisted on in the foregoing pages, between the constitutional condition and special influence which conjointly minister to gout, it is by no means designed to withdraw attention wholly from the latter, or to decry any enquiry by which a precise knowledge of it may be attained. The discovery, whenever made, must render essential service, and no opportunity of effecting it should be neglected. But until profound research or some fortunate accident shall disclose what has hitherto been hidden from our view, we must be content, if we would render our practice either consistent or effective, to follow that guidance which our familiar acquaintance with febrile and inflammatory affections so amply affords.

If the character of gout in its simplest form and highest intensity be unequivocally inflammatory, it is difficult to conceive why its various shades and modifications should be otherwise regarded. The differences are not greater than are continually met with in several other diseases; nor, when they do occur, is there any difficulty in referring the peculiarities to the particular constitution, the effects of previous disease, and other contingent circumstances amply sufficient to account for them. These circumstances may, and in numberless instances do require that the appropriate remedies of inflammation should be applied with caution; but they can by no means warrant the principles of treatment founded on the inflammatory nature of gout being wholly reversed, as is too often witnessed. There has been too much disposition, arising from timidity, ignorance, and false theory, to transfer to simple active gout the cautions and the apprehension of interference which contemplation of the complex and less active modifications has given rise to. The converse of this reasoning, if more generally adopted, would have led to happier results, to more prompt and effectual relief of gouty sufferers, and to a juster estimate of the practical benefits capable of being afforded by medical science.

Having thus prepared the way for a clear and intelligible discussion of gout, we shall proceed to treat the subject more methodically, and, so far as we are able, elucidate the circumstances which give rise to its various degrees and modifications, so as to enable the young practitioner to discriminate in the use of his remedies, and neither to withhold from gout the treatment which its prevailing character de-

mands, nor to carry this beyond the point which sound experience warrants.

The paroxysm of gout has already been cursorily noticed. It is necessary to present it more fully, so as to mark distinctly the peculiarities which distinguish it from simple articular inflammation. Cullen defines regular gout as, "*podagra cum inflammatione artuum satis vehementi, per aliquot dies perstante et paulatim cum tumore pruritu et desquamatione partis recedente.*" Accounts of the symptoms which precede and accompany the fit are rendered by all authors who have treated of the disease, to whose works we must refer those who wish to know all the morbid phenomena which may precede or attend the paroxysm. Sydenham, who, when he wrote his treatise on the gout, had been a personal sufferer from the malady for four-and-thirty years, has detailed those symptoms with a minuteness and accuracy that cannot be surpassed. He represents the attacks of gout as in general coming on suddenly, with scarcely any signs of its approach, except that the patient has been afflicted for some weeks before with bad digestion, crudities of stomach, and much flatulency and heaviness, which gradually increase until the fit begins; this, however, being preceded for a few days by a numbness of the thighs and a sort of descent of flatulencies through the fleshy parts thereof, along with convulsive motions; and the day preceding the fit the appetite is sharp but preternatural. The patient goes to bed and sleeps naturally until about two in the morning, when he is awakened by a pain which usually seizes the great toe, but sometimes the heel, the calf of the leg, or the ankle. The pain resembles that of a dislocated bone, and is attended with a sensation as if water just warm were poured on the membranes of the affected part; and these symptoms are immediately succeeded by a chilliness, shivering, and slight fever. The chilliness and shivering abate as the pain increases, which is mild in the beginning, but grows gradually more violent every hour, and comes to its height towards evening, adapting itself to the numerous bones of the tarsus, the ligaments whereof it affects, sometimes resembling a tension or laceration of these ligaments, sometimes the gnawing of a dog, and sometimes a weight and coarctation or contraction of the membranes of the part affected, which become so exquisitely painful as not to endure the weight of the clothes, or the shaking of the room from a person's walking thereon; and hence the night is not only passed in pain, but likewise with a restless removal of the part affected from one place to another, and a continual change of posture. Nor does the perpetual restlessness of the body which always accompanies the fit, and especially in the beginning, fall short of the agitation and pain of the gouty limb. Hence numberless fruitless endeavours are used to ease the pain by continually changing the situation of the body and the part affected, which, notwithstanding, abates not until two or three in the morning, that is, till after twenty-four hours from the first approach

of the fit, when the patient is suddenly relieved by a moderate digestion and some dissipation of the peccant matter, though he falsely judges the ease to proceed from the last position of the part affected; and being now in a breathing sweat, he falls asleep, and upon waking he finds the pain much abated, and the part affected to be then swelled; whereas before only a remarkable swelling of the veins thereof appeared, as is usual in all gouty fits. Such is Sydenham's description, which we have given in his own words as translated, being reluctant to weaken the force of such graphic delineation by any attempt at abridgment. The little admixture of theory evinced in the reference to digestion and peccant matter, cannot detract from the truth or value of this clear and circumstantial recital. For some days after this accession he represents that slighter degrees of pain and fever recur each evening, continuing until morning, after which all disease ceases, and the patient is restored to more vigorous health both of body and mind than he had antecedently experienced. This is the simplest course of a gouty paroxysm, and that which it usually runs on a first attack. On succeeding seizures, especially when the constitution is robust and plethoric, inflammation, on subsiding in one joint, becomes renewed in another, and eventually several joints are attacked in succession, and often two or more at the same time; so that in this progress every variety of intensity, extension, and duration becomes ultimately encountered. To dwell on these different degrees would be useless, as they are all but extensions and modifications of the simple paroxysm, requiring no modification of treatment beyond what the severity of the attack and the existing state of constitution enjoin.

The attack of gout is said to take place suddenly, and with scarcely any previous warning. Yet the very accounts which so represent it give abundance of premonitory indications, which are stated as preceding the attack even for some weeks. Dyspeptic derangements, with some nervous ailments, are the precursors usually noticed; and the assertion of good health existing up to the period of the gouty accession seems to have rested, not on any positive examination or knowledge of the fact, but on the mere circumstance of the patient not having his consciousness so aroused by any precise or considerable indisposition as to complain of being ill. So far as we have had opportunity of noticing the state of health which precedes the gouty seizure, we utterly disbelieve this assertion, and are satisfied that if the phenomena which mark incipient plethora and progressive febrile action were duly noticed, the same constitutional derangements which precede other inflammatory affections would be found uniformly to usher in gout. Disturbances of gastric and nervous functions are acknowledged; those of the circulation would be no less manifest if practitioners were more familiarly acquainted with the changes which the pulse undergoes in progressive plethora, from the stage of oppression marked by a pulse low and irregular both in force and

frequency, to that of the permanently excited action of fever or inflammation evinced by a quick pulse, hot skin, and furred tongue.

One of the earliest instances of the introductory stage of gout which came under our observation occurred many years ago, and served to confirm impressions which our mind had for some years preceding been gradually receiving, from a careful observation not only of gout, but of all other inflammatory diseases. The case was detailed in some pathological and practical observations published in the *Edinburgh Medical and Surgical Journal* in 1814, from which we now extract it. It will shew at least how much constitutional disturbance, perfectly obvious and unquestionable, may exist while the person affected is unconscious of being otherwise than in perfect health. "A gentleman about forty years old, and of full habit, had been subject to gout for several years. He arrived in this country in the course of last summer from America, where he had suffered several attacks of the disease. The treatment experienced under them I cannot specify, but in the intervals he was enjoined to take a pint of wine daily, in consequence of his gouty habit. This he acquiesced in from unwillingness to put his own judgment in competition with that of his physician, although he disliked the remedy, and thought himself always worse both from wine and full living. He called on me in autumn last, to know if he should drink the Bath waters, as recommended by his American physician, at the same time stating himself to be particularly well and free from complaint. I found his pulse full, strong, and nearly 100, and his tongue whiter than it ought to be. I consequently discountenanced any trial of Bath waters, and gave my opinion that he stood much more in need of bloodletting and evacuations. As he professed himself, however, to be so very well, I did not feel myself warranted in pressing this, though satisfied that his habit of body approached much too nearly to a state of inflammation. This conversation took place on Wednesday, the 14th of October; and on Thursday, the 15th, he was attacked with gout in the right knee. On Friday, a second attack took place in the left foot; and on Saturday I was sent for. I found his skin hot, tongue white, and pulse 106, full and strong. Sixteen ounces of blood were drawn, after which the pulse fell to 84. A full dose of a purgative, consisting of colocynth, calomel, and antimonial powder, was given at bed-time, and a solution of Epsom salt the following morning. On Sunday he was better in every respect, but the pulse was again up to 96. It evinced clearly a necessity for further bloodletting; but as the purgative was then operating and the local disease abating, I was satisfied to order the bloodletting to be repeated the following morning. It was not in time, however, to avert a third attack, which took place during the night in the right elbow. Next morning I found the pulse as much reduced as if bloodletting had not been practised, although it did not take place in consequence of the state of

the arm. Whether this effect was owing to relief to the general circulation being afforded by the formation of the local disease which had occurred during the night, or whether it proceeded from a degree of syncope and nausea which were experienced at first rising, or whether they were all dependent on some common cause, I shall not pretend to determine. At this time the knee was nearly well and the foot much better; and as the tendency to syncope had not entirely gone off, and he felt reluctant to have both arms incapacitated, he expressed a wish that the bloodletting might be deferred until the gouty arm got better. On Tuesday the foot was almost well, and the elbow getting better. The pulse, however, was again 96, full and oppressed, which determined me against incurring any further risk, and on having recourse once more to the lancet. About fourteen ounces of blood were taken, which induced some faintness. On Wednesday the pulse was 84, and there was no renewal of gout. Purgatives, salines, and low living were the only means employed thenceforward, and from this period he rapidly recovered. On the 26th he walked to my house, and could have done so some days earlier had the weather permitted. He expressed himself much gratified at the treatment he had undergone, as confirming the correctness of those views of the disease which he had always entertained, and declared to me that he had never thrown off such an attack so quickly, so perfectly, or with such unimpaired powers."

On the treatment pursued in this case we shall only remark, that had it occurred to us later in life, when our judgment was more matured, and our conviction of the safety and efficacy of active practice in gout confirmed by more ample experience, we should have hesitated less in affording the appropriate relief, and the result would have been still more favourable. The case, independently of the result, is of value on two accounts,—as exhibiting the unequivocal state of constitutional inflammation which precedes the gouty paroxysm, and as shewing how far constitutional disturbance may prevail without the party having any consciousness of its existence. Were it not for the accidental examination made on the day preceding the attack, this person on the evidence of his own consciousness would have been pronounced in perfect health up to the period of the gouty accession. The inferences deducible from the facts here stated have been uniformly confirmed by all that we have seen of gout from that period to the present time.

Although gout, then, may arise without any evident external cause, a cause sufficiently manifest may be discovered in the attendant state of constitution by those who seek for it. It is true that where the gouty diathesis is strong, a slight degree of plethora may suffice to call it into activity, and in these instances the plethora and inflammatory tendency may, if not closely investigated or if only loosely observed,

escape detection. Our firm persuasion, however, impressed by all that we have seen of the disease, is, that in every case of spontaneously occurring gout, more or less plethora either absolute or relative, and of inflammatory tendency sufficiently discernible, precedes the gouty accession; and that in proportion as this state is borne in mind, and the treatment regulated with reference to it, will the fit be more speedily and effectually relieved, the period of exemption prolonged, the ravages in the joints prevented, and the contingent maladies averted. From this view of the subject, it is clear that high feeding and indolence are very properly enumerated among the predisposing causes of gout. From these fullness of habit arises, and this, as will be more fully shewn in the article PLETHORA, leads to a series of phenomena, which indicate first an overloaded and oppressed state of circulation, and afterwards one of increased action. When the latter attains its full activity, it constitutes what we call fever or inflammation, and any accident may determine the part which is to suffer most, and the function which is to be most depraved. When this plethoric and inflammatory state arises in a gouty habit, the result is an accession of the disease.

A remarkable peculiarity of gouty accession is, that the supervention of the local inflammation gives relief to the constitutional disturbance, and that, having effected this, it quickly and spontaneously subsides, at least in the earlier attacks, leaving the part so lately the seat of formidable derangement, somewhat weakened indeed, but otherwise in perfect health. The dyspeptic derangements connected with gout are no doubt traceable in a great degree to the luxurious living and consequent irritation of stomach habitual with those who chiefly suffer from this disease. But this is not their sole cause, for independently of the various excitements to which the stomach is subjected, the direct effect of plethora is to induce a congestive state of the capillaries of the mucous membrane of both stomach and intestines, and an increase of its appropriate secretions,—a condition which is the fruitful parent of gastric and intestinal maladies of various kinds. In the absolute plethora of robust habits, especially when the gastro-intestinal membrane is excited by full living and stimulants, this increased secretion of mucus in the stomach and intestines is considerable, and its production is readily accounted for. The efficient cause seems to be excitement of the secretory vessels by determination of blood to the capillaries, and by the blood possessing, from the redundancy of nutritive matter, more stimulant properties; the end,—increased appropriation of the nutritive matter of the blood, and consequent relief to the overloaded circulation from that redundancy which oppresses and disturbs it.

In the less vigorous and more temperate a correspondent state arises, when from diminished appropriation of blood, through sedentary life, inactive habits, or any other cause,

the relative quantity of nutritive matter becomes greater than can be healthfully disposed of. And this serves to explain how a state of plethora and of febrile tendency so often occurs even in habits naturally spare, and where no obvious intemperance has been practised. Yet even in these the evidences of a plethoric state are readily discernible, and at an early period, if the phenomena which indicate it are rightly understood; and the effects, as displayed in the gastric and intestinal secretions, are in them even more signal than those which positive plethora usually displays, the morbid condition of the mucous membrane being generally of longer continuance and more confirmed ere attention is directed to it. These effects, though modified, are essentially the same in both, and require a similar treatment; this differing in degree only according to the different powers of the constitution so affected, and being modified only by the state of the mucous membrane, and the greater or less time during which the congestion has been suffered to endure.

If the treatment, therefore, required for the more active and simple state of disease be once established, that of the lower gradations and more complex conditions will be sufficiently apparent, differing not in kind but degree, and combined with auxiliary remedies as incidental derangements may require. In weakly habits, and where the constitution has been suffered to struggle long under unrelieved plethora, these derangements are numerous and proteiform, harassing the patient and confounding the physician. So long as they are regarded as special maladies, and treated without direct reference to the state of constitution in which they originate and by which they are upheld, the aid of medicine must be precarious and its success uncertain, conferring little benefit on the sufferer or credit on medical science. When assailed at their source by relieving the overloaded circulation, and restoring to more healthy action the several functions over which our remedies have direct and acknowledged powers, they readily give way, yielding oftentimes to the general improvement of constitution without any special means whatever being needed for their relief. To the gastric and intestinal derangements, and to those which evince disturbance of nervous function, these observations more immediately apply. Digestion is impaired, and weakness of stomach is pronounced, for which cordials and tonics are deemed the appropriate remedies. Transient relief perhaps ensues in some improvement of sensation, some increase of appetite, and thus error becomes confirmed. But, unless evacuants be adequately and discriminately combined, such remedies ever do more harm than good. Administered alone and as the chief agents of cure, they tend directly to aggravate and perpetuate disease, repressing those efforts by which the overcharged vessels would, through increased secretions, unload themselves, and ultimately establishing organic

lesions of different kinds. By continuance in their use, impression is made on the mucous membrane, diminishing its morbid secretions and thus appearing to correct them, while the stimulants conjoined impart some feelings of renewed strength. Both effects, however, are eminently delusive. By suspending increased secretion, which, rightly understood, is the direct result of a congestive state of the capillaries, and the natural means of relieving them, disease is only transferred, not removed. It may for a time quit the capillaries, or rather its character in them is altered; but it is only to be driven back on the larger vessels, where it leads to deep-seated congestions and to disorganization of various kinds. If the constitution be still entire, it is pretty sure under such circumstances to become aroused sooner or later to some febrile or inflammatory effort, for which evacuations become indispensable, and thus relief to the oppressed and overloaded organs is at length afforded; if languid or much depraved by long continuance of the morbid condition, and still more if this condition have been aggravated by abuse of cordials and stimulants, and by the neglect of evacuations, then the constitutional efforts are feeble, they are disregarded or misunderstood, and a more assiduous use of wine and sustenance is urged for nurturing that strength which such means so applied never can restore. In like manner the various nervous maladies connected with this state of constitution run a similar course. Stimulants, antispasmodics, and narcotics all lend their aid, but it is to palliate only, while in reality they do mischief. These maladies depend much on nervous sympathies arising from disordered stomach, but they are also in part owing to direct disturbance of the brain itself, through irregular circulation and morbid condition, chiefly of a congestive character, of its substance or investing membranes. Stimulants may, and oftentimes do, relieve this state for the moment, by rendering the cerebral circulation more active, and thus giving greater energy to nervous function; but the disease is not thus cured,—scarcely mitigated: the effect lasts no longer than the brief period during which the stimulus maintains its influence, and the state which ensues is still further removed from that of health. This can only be restored by so regulating the circulation that the mass of blood shall neither by its quantity nor quality cause any extraordinary excitement of the vessels which convey it, nor need any increased efforts on their part for its disposal; and afterwards by rendering such assistance to the several secretory and excretory functions as shall re-establish them in the healthy and efficient exercise of their respective offices.

In judging of the instances in which tonic and stimulant regimen is supposed to be beneficial, and which are continually adduced in proof of its propriety, it is necessary not to decide hastily or absolutely from the immediate effects, but to watch such cases to their close, when the consequences will be sufficiently

demonstrated. Many alleged cures are thus performed for which the parties have little cause to be grateful. Sooner or later formidable disease is sure to ensue, its form depending on the accidental excitements to which the body is subjected, and on the peculiar tendencies to which it is prone. In a gouty habit, reproduction of gout, and its confirmed establishment in its most aggravated shape, can hardly fail to be the result of such a regimen.

They who see much of what are termed chronic diseases must have ample opportunity of verifying by observation what is here stated. These cases present every species of internal congestion to which plethora, unrelieved by due evacuation and aggravated by stimulants, can give rise. Too often are the lesions of structure thus occasioned beyond the reach of art, while the exhaustion and attenuation are such as to preclude all attempts to relieve save by temporising palliatives. How much of this kind of evil the constitution can bear, however, and how long an oppressed and overloaded circulation may endure without annihilating all hope of relief by rational treatment, is continually exemplified. Where there is no particular tendency to local or specific disease, and the effects of plethora and of febrile action are diffused over the whole frame, they may continue for months or years, still retaining all their original character, and still admitting of valuable relief from appropriate and duly active practice. Nay, even where a special disease is engendered, if it be one of slow progress and which does not immediately affect life, it may continue for years to cause extreme distress, and yet be capable of relief from rational treatment. The following case may illustrate these several positions. A delicate female had for ten years laboured under varied and extensive disease, which from all that we could learn had been throughout of the character which we have described. Being weakly, however, and exquisitely nervous; her complaints were referred to debility, and she was pampered and stimulated with tolerable assiduity. Symptoms of general dropsy were superadded to her other complaints, and were making rapid progress when she applied to us. The character of the disease was obvious enough; the remedies were equally so; but great caution was necessary in resorting to them, both from the extreme exhaustion, and from the constitution being extensively and miserably depraved. Yet was there no alternative, for without bloodletting effectual relief could not be afforded, and from the rapid progression of disease she must have speedily sunk. We drew blood in small quantity, which was thickly buffed and cupped; purged freely, and enforced low diet. The relief was prompt: the dropsical swellings subsided, nervous maladies declined, all her feelings were improved, and even strength was increased. Blood was afterwards taken repeatedly and more freely, and she ultimately became relieved from all her complaints so far as her broken health and the ravages sustained by

long-continued disease would allow. For some years she has, in consequence of this relief, had much more enjoyment of life; and so satisfied is she of the remedy to which she is chiefly indebted, that she is herself the first to call for the lancet, when, as occasionally happens, recurring plethora or febrile action indicate its employment. This case, though not one of gout, serves to demonstrate the state of constitution which we wish to illustrate, and which is continually met with in connexion with gout; such cases, whether gout be incidental or not, require that the healthy balance of circulation and of the circulating fluid be restored, as the first requisite; and that the several secretions and excretions be corrected and promoted according as their respective derangements demand. When this is done on the principles applicable to all diseases, then may the special nature of gout receive any peculiar consideration to which it may lay claim. But so long as a plethoric state of constitution exists,—a point on which no deceptive appearances should be suffered to mislead,—and the several secretions and excretions are depraved, must all special treatment of gout by imputed specifics be subordinate to those corrective measures by which the constitutional derangements are rectified, and general health restored.

As some have cavilled at the term constitutional as thus applied, and with a subtilty of criticism more ingenious than profitable, have denied that any such thing as constitutional disease can exist, inasmuch as every morbid action must affect some part of the system, I shall here remark that I employ the term constitutional in reference to the general condition of the frame, and the collective exercise of its several functions, the due balance of which constitutes a state of health. Derangement of these functions is more or less attendant on all diseases, yet it is not always considered as forming a part of them, and is in consequence too apt to be overlooked. The general health dependent on these functions we consider as having a claim to attention in every disease, even superior to that of the special malady; it is this state to which the term constitutional is applied, and we know not how it could be so well expressed by any other. In gout it is this which is entitled to our very first consideration, for not only is constitutional derangement attendant on every accession of gout, but some degree of it is essential to the formation of the paroxysm. In proportion as gouty diathesis prevails, will greater or less degrees of constitutional derangement arouse it into activity; but some previous disorder of the general health, some antecedent disturbance in the healthy balance of functions, is necessary to this end, for without such there would be no paroxysm. On a just conception of this truth all prophylaxis must depend.

After the foregoing discussion of the nature and character of gout, we might at once proceed to the curative treatment, were it not that this essay, which is to serve for an elementary as

well as practical treatise, demands a detailed exposition of several circumstances which have not yet been noticed. For the sake both of perspicuity and brevity, we shall, in what remains, follow the order which methodic treatises on diseases usually observe.

Our general remarks on gout have been hitherto confined to those circumstances which more particularly indicate its character, and mark the morbid conditions which tend to produce it. Several others, however, require to be noticed; and here, as well as in the subsequent sections into which the subject will be divided, we shall occasionally borrow from what we have ourselves already published; and this not from indolence, but from the persuasion which we entertain, that where opinions are founded in truth, the original expression of them is more likely to be terse and correct than any repetition clothed in a different phraseology.

Dr. Cullen's definition represents gout as an hereditary disease. It is so generally, but by no means universally; and so far this character is improperly introduced into a definition. The general truth, however, of a predisposition to gout being entailed on offspring, is too well established to admit of dispute. Cases no doubt continually present themselves where no hereditary taint can be traced, manifesting that this is not essential. Dr. Scudamore, in some interesting tables, has shewn that of a given number the greater portion acknowledged no hereditary claim to the disease. The fact of hereditary disposition, however, is not thus set aside, but has been too strikingly exemplified in numberless instances to be easily shaken. From the very slight influence which this point has either on pathology or practice, it is, in truth, of little real importance. The only consequence of admitting such predisposition seems to be, that when it is supposed to exist, gout may be expected to take place under circumstances which, independently of this tendency, would not have power to originate it; and that hence a salutary caution may be suggested to those who have any consciousness of hereditary claim, to guard with particular care against the various causes which excite gouty action. While false theory prevailed, and the establishment of gout in the extremities was considered essentially desirable as relieving the constitution from peccant humours supposed to be thrown on the affected joint; and when the suspicion of a gouty diathesis led to a free use of stimulants as a means of repelling the enemy from vital parts; then the supposition of hereditary taint was not harmless, the regimen enjoined tending directly to arouse what might have lain dormant, if not to create what might otherwise never have existed. But if rational principles of gout, its nature and treatment, were generally established, the admission of its being hereditary could lead to nothing but good, and might effect such changes as would in time cause the evidences of hereditary disposition wholly to disappear. Indeed it would be well if the fact of hereditary transmission

were more generally received and more deeply impressed, as many who would prefer the liability to gout to any sacrifice of luxurious indulgences, so long as they regarded the choice as affecting their own persons alone, might exercise some self-restraint if assured of the consequences which their excesses might entail on their offspring and descendants.

Though the paroxysm of gout usually occurs in the way described, and without any evident external cause, yet any accident or injury of a joint occurring in a gouty subject, may, instead of simple inflammation, bring on a fit of gout, or rather the local inflammation excited may assume all the characteristics of that disease.

The precedence of gastric derangement is not necessary to constitute gout, many being unconscious of any such up to the accession of the local inflammation. In advanced cases, however, and in broken constitutions, this premonitory indication is rarely absent.

Pyrexia so generally attends that it may well be considered a characteristic feature. In those cases where, from languid or enfeebled powers, it is less obvious, and where to superficial observation it might appear not to exist, more careful investigation of symptoms would rarely fail to detect it.

Women, though not exempt from gout, are less subject to it than men. Dr. Gregory used to state the proportion as one to fifty in England, one to one hundred in Scotland. For this relative immunity in females they seem indebted to their greater temperance, and also to the facilities which the female constitution possesses of throwing off redundancies by natural outlets. Dr. Gregory had observed among his patients, that the women who suffered from gout had antecedently been subject to profuse hemorrhages, such persons being generally plethoric through indolence, sedentary lives, and high feeding, and hence predisposed.

Vigorous and robust constitutions are most subject to gout, though no spareness of habit affords security against it. The cholero-sanguine temperament is said to be that which is most liable.

Gout is most generally a disease of middle and advanced life. Its attacks usually occur from the age of thirty-five onwards. When the predisposition is strong, however, it may commence much earlier. Dr. Gregory met with it oftentimes among his pupils, young men from 18 to 22, and who had not earned it by intemperance.

The relief to the general health imputed to the superpervention of the paroxysm, though an observation partially founded on truth, becomes progressively less speedy and less signal as the disease advances. It has ever been too much relied on, and has led to much pernicious practice, both medicinal and dietetic.

So many causes, both remote and immediate, have been assigned to gout, that they require to be noticed; for though most of them are merely contingent and accessory, they all merit attention where regard to the juvenia and lædientia is so important.

Hereditary disposition has been sufficiently discussed, as have also the influences of plethora and of the unascertained cause from which gout derives its distinctive character. Whatever induces a state of plethora may become a cause of gout, whence luxurious living, indolence, and sedentary habits, have ever been the chief means of exciting or producing it. By these is the gouty predisposition urged on to active disease; and, so far as our knowledge extends, they are fully capable of originally producing it. The extremes of luxury or of indolence, however, are not required to produce this effect. Lesser degrees may induce plethora sufficient to destroy the balance of health, and thus beget disease. A slight redundancy of nutritive matter in the blood, whether arising from excessive supply or diminished expenditure, may create an inflammatory state, which, in a habit predisposed, may lead to gout, even where the habits of living may appear temperate, and where moderate exercise is taken. No terms are more loose in their general application than temperance and exercise. Credit is continually claimed for the former, where the animal food and wine habitually taken far exceed what nature requires or can bear; and the name of exercise is oftentimes given to bodily exertions so gentle that they lead to no increased expenditure of blood, while, by increasing appetite, they too often tend to augment and enrich it. Gout is a disease of the rich and indolent, not of the poor and laborious; and this truth, so obvious and incontrovertible, ought to have had more influence on medical opinions than it has been allowed to exercise. If there were no other fact whatever ascertained, this alone might suffice to point the way to the efficient prevention and treatment of gout. In Scotland there is an old saying worthy of being held in remembrance, that any man may free himself from gout by working for and living on sixpence a-day.

Next to plethora, whatever causes induce debility of stomach have been regarded as principally influential in bringing on gout. The observation is to a certain extent true; yet the facts on which it rests have been egregiously misconceived, and much pernicious practice has in consequence resulted. Weakness of stomach being assumed, tonic and invigorating regimen were of course considered as indicated, and long and pertinaciously has its use been persisted in, notwithstanding the utter failure of such treatment to mitigate, much less subdue the disease. Had the nature of this assumed debility of stomach been more closely investigated, it would have been seen to present a character very different from what tonic or stimulant remedies could essentially relieve. It might, at least in the earlier stages, have been directly traced back consecutively to inordinate and depraved secretions, turgid condition of the mucous membrane, congestion of the capillaries, and general plethora, all readily relieviable at the commencement by evacuations and abstinence, all aggravated by nutritive diet, stimulants, and tonics. All reference, therefore, to debility of stomach as a cause of gout should

extend, not merely to the alleged weakness, but to the several causes, both coincident and consecutive, by which the important function of digestion becomes weakened or disturbed.

Various causes are instrumental in exciting the paroxysm, but they are all subordinate to those mentioned, and incapable of such effect unless where depravation of health has prepared the way. Excess of venery is an acknowledged exciting cause, as is also abuse of spirituous liquors, as well as indigestion, whether occasioned by the quantity or quality of the food taken. To the immediate effects of this last cause may be referred many cases of imputed gout in the stomach, which have been wholly independent of gout. Dr. Gregory used to relate a case where he was called to a patient said to have been seized with gout in the stomach; but he found his complaint caused, not by gout in the stomach, but by pork in the stomach, of which difficultly digestible food he had too liberally partaken. By getting rid of it he was perfectly relieved, and there was nothing more heard of gout for that time.

Intense study has brought on gout. It is stated by Sydenham that one of his most severe attacks was occasioned by immoderate application in writing his essays on the disease, and that gout returned as often as he attempted to go on with the work.

Purging has been said to bring on the paroxysm, and such a coincidence no doubt occurs; but it would be a great error to suffer this observation to deter from a judicious use of purgative remedies.

Continued costiveness is a more probable cause, yet this can only be regarded as an incidental derangement, depraving, so long as it continues, several other functions, and adding to the disorder of the general health.

Change from activity to indolence has been often noticed as leading to gout, a circumstance readily understood. Change from low living to high is equally intelligible. But sudden change of the opposite kind has been marked by the same effects, as was signally exemplified in the patients of the celebrated Dr. Cheyne. He, as all know, was the advocate of temperance, and having enjoined it to his gouty patients rather too absolutely, and without sufficient discrimination, he had the mortification to find that his directions, so far from obviating the attack, hastened the paroxysm, which afforded great exultation to the opponents of his doctrines. Their triumph, however, was far from complete, although it served for a while to confirm existing prejudices.

The hypothesis of gout being caused by a special morbid matter, eliminated and expelled by means of the paroxysm, has been fully and ably refuted by Dr. Cullen. There is no proof whatever of any such existing; and assuredly it is not, as was long imagined, identical with the concretions deposited in gouty joints.

Cold, heat, external injury, depressing passions, too great exercise, especially in walking, have all been enumerated among the causes capable of exciting gout; but they can only be

regarded as mere accidents, having no power to induce the disease, save when the habit is on the very verge of the paroxysm.

The diagnosis of gout must be derived from its history and general character, for there is no pathognomonic symptom whatever to distinguish it from rheumatism, the only disease with which it is liable to be confounded. Each disease, perfectly formed, is sufficiently distinct from the other; but the intermediate degrees approach each other so nearly, that to discriminate with absolute certainty would require a more intimate acquaintance with the essence of both diseases than we can take credit for possessing. All that can be done here, then, is to note the peculiarities of each, and then to leave it to the practitioner's own judgment and observation to decide to which any equivocal case may belong.

Gout is generally a disease of advanced life, not occurring for the most part till thirty-five; rheumatism most frequently attacks the young, that is, from the age of eighteen to thirty. Yet the converse of this is so often true, that the observation furnishes no ground of accurate diagnosis; rheumatism attacking every age, while, as has been shewn, not even childhood is exempt from gout. Gout in its earlier attacks fixes on one joint, extending not beyond; rheumatism, even on its first seizure, most generally involves several. Gout, while simple and incipient, runs a definite course, the local inflammation spontaneously and completely subsiding in a few days; rheumatism has less tendency to spontaneous decline, and, unless arrested by prompt and active treatment, usually continues much longer. The subsidence, however, of local inflammation in rheumatism under active treatment resembles very closely the natural abatement of gout. In gout the constitutional disturbance sensibly abates on the supervention of the local inflammation; this does not appear to be the case in rheumatism, where, on the contrary, the articular inflammation is often attended with increase of fever. In gout the part inflamed is red, tense, shining in a high degree; in rheumatism it is less so in all these respects. Desquamation of the cuticle has been regarded as a criterion of gout; but the cuticle is oftentimes detached in rheumatism much more extensively than ever occurs in gout. We have seen the cuticle so completely separated from the hand and wrist in rheumatism as to admit of being drawn off like a glove. In gout the pain is exquisite, even when the part affected is at perfect rest; in rheumatism it is much more moderate when the part is at rest, though most acute on the slightest motion. Gout is more apt to be preceded by gastric derangement than rheumatism. After all that can be said on the subject of diagnosis, much uncertainty must still attach to many instances, while there are modifications which partake so much of both, that it would be impossible to assign them with certainty to either; and accordingly we find the term rheumatic gout, though not recognised by nosologists, in familiar use among the vulgar, and not scorned even by practitioners. Are we

yet prepared to decide to which the very peculiar disease known among medical men as nodosity of the joints belongs? It is usually classed with rheumatism, yet are there quite as many grounds for allying it to gout. After all, the distinction is of little real importance, for if the pathology of gout, which we believe to be true, be established, the treatment of the individual case will not be very different to whichever genus of disease it may be assigned.

The prognosis of gout must depend on so many circumstances, that it would be impossible to affirm it positively or with any precision. Simple gout occurring for the first time runs a determinate course, ending generally in health, and cannot therefore be regarded as a disease of much danger; on the contrary, it has, by a strange delusion, been customary to hail its presence as conservative of health and a guarantee for longevity! However the supervention of the paroxysm may occasionally obviate greater evils, we should greatly doubt the desirableness of its occurrence, and must leave it to gouty sufferers to appreciate both the value of the remedy and the enjoyment of the years so prolonged. In advanced gout the state of constitution, the ravages already sustained, the organs incidentally affected, and even the principles on which the treatment of the particular case is conducted, must be taken into account ere any conception either of the probable duration or event can be formed.

It has been customary to represent gout as incurable, and for ages it has been pronounced the opprobrium of medical science. Ere proceeding to discuss the treatment, it may be worth while to consider how far this reproach has been justly attached. Whether there be or not a cure for gout, is a question of which the answer must depend on the sense in which the term cure is used. It is a common error to contemplate diseases as if each, instead of consisting of an aggregate of functional disturbances, were itself something individual and specific,—some element superadded to the frame producing a specific derangement of health, and capable of being corrected or neutralized by its proper remedy, as a poison by its antidote. Thus the doctrine of specifics has ever prevailed, and it continues to hold its ground even at the present day. It has even been imagined that as mercury is an imputed specific for syphilis, cinchona bark for intermittent fever, there must for every disease exist in nature some peculiar and appropriate remedy which it is the business of physicians to discover. No disease has been more signally subjected to this misconception than gout, and the search for a specific capable of extinguishing it has been often and anxiously renewed. To those who thus judge of diseases and their treatment, it may be confidently replied that there is in medicine no cure for gout, for no remedy capable of realising such expectation ever has been discovered, or ever can be. To such delusion gouty sufferers are peculiarly inclined, for, habituated for the most part to luxurious indulgences, and reluctant to forego them, they lend a willing ear to every

vain boast which affects to cure them without a sacrifice of their sensual enjoyments. The consequences of this error have been doubly injurious, not only by diverting attention from that investigation of the disease which could alone explore its real nature and devise its proper treatment, but also, where any remedy of peculiar efficacy was happily discovered, by causing such indiscriminate application as to render it in the end more injurious than serviceable, and at length to destroy the reputation to which it might justly lay claim. But if gout be regarded as it really is, an assemblage of functional derangements, traceable respectively to intelligible causes, and, when rightly understood, admitting of correction by suitable agency, then, though there be a superadded cause in the essential principle of gout, of the precise and intimate nature of which we are still ignorant, the disease may be pronounced curable in the same sense in which we apply the term to other maladies, provided practitioners, instead of vainly seeking for specifics, pursue the course of treatment which true medical science enjoins, and patients be content to follow that regimen by which alone the end can ever be attained. By medicine alone we can do little to obviate the predisposition which leads to gout; but by suitable regimen duly and inflexibly persevered in, we may render it harmless, so that even in cases of high susceptibility, where, notwithstanding our best care, paroxysms may occasionally recur, these will be slight, and productive of but little evil. But even this liability, if manifested in the earlier periods, should be regarded as owing to some imperfection in the use of preventive means; for if these be fully and judiciously employed, the renewal of paroxysms may, as long as the general constitution is still uninjured, be wholly and effectually prevented.

This assertion, as now expressed, is of course limited to those cases where gout on its first accession is subjected to proper discipline both remedial and prophylactic; for where the predisposition is strengthened by repeated accessions of the disease, and disorganizations have taken place in the joints, or any of the viscera have, through the effects of gout, become depraved, the hopes of complete success must be proportionally weakened. In this sense, then, it may be boldly averred that gout is not an incurable disease. We can cure the paroxysm, and can restore the patient to perfect health, which it is in his own power afterwards to preserve; and if he, in defiance of right counsel, renews the disease by continuing the luxurious and indolent habits which foster it, the reproach should lie, not on medical science, the precepts of which he disregards, but on his own weakness and wilful perseverance in injurious practices. Other diseases as well as gout, nay all, are liable to recur on the predisposing and exciting causes becoming renewed; yet they are not thence considered incurable, nor are they deemed a reproach to medical science merely because medicine alone cannot secure against relapse.

There is no reason why relapse of gout should not be equally referred to a renewal of the causes which lead to it, and as the principal of these are obvious and capable both of prevention and correction, the incurableness of gout should not be alleged so long as the means of cure are neglected or inadequately employed, nor should medical science be reproached when its clearest dictates are discredited, and its most urgent remonstrances unheeded and despised.

The most important treatment of gout is the preventive; for if this, however successfully the paroxysm may be relieved, be not assiduously pursued, disease will recur, and acquiring force by repetition, will eventually inflict all its wonted penalties. The principles, too, of the preventive treatment are the same which should govern the practice through all stages and conditions of the disease, modified only by contingent circumstances, but never superseded nor reversed; on which account a full discussion should be given in the first instance to the prophylaxis of gout.

If the views exhibited in the foregoing pages be not wholly fallacious, the establishment of a rational and efficient prophylaxis of gout can be neither difficult nor doubtful. It has been seen that to constitute gout two circumstances must concur,—a predisposition to this form of disease, and a loss of balance in the constitution through excess of nutritive matter, creating what is termed plethora, and arousing the predisposition into active disease. It would be useless to dwell on, or affect accuracy in deciding which of these conditions is the more active, which the more passive,—which should be called the predisposing cause, which the exciting. The main point to consider is, that their concurrence is essential; for if there be no tendency to gout, plethora may induce any other form of local inflammation or fever, but will not give rise to gout; if there be no plethora, even a strong hereditary disposition may lie dormant, and the elements of gout, of whatever nature they be, will not shew themselves by the formation of a paroxysm. Of these causes one is utterly unknown to us, and consequently we are unprovided with any positive or direct means of acting on it; but the other is completely under our controul, and however great the tendency to it in any instance, we have ample power when it does arise to remove it by means of depletion and abstinence, and to prevent its recurrence so as with certainty to keep within the bounds of health by temperance and exercise. To these few and simple instruments of prevention may be referred all the procedures required for prophylaxis; all further discussion of which must consist of pointing out the degree in which they may be severally required, and the modifications necessary in applying them so as to attain the end desired without hazarding other evils, to obviate redundancy of nutrition without withholding adequate sustenance; to repress hypersthenic orgasm without inducing asthenic debility; and, in averting an inflammatory dis-

ease, not to beget others of an opposite character, but to preserve the constitution in that due exercise of all its functions which perfect health implies and requires.

Though the instances may not be many of gout being eradicated or kept quiescent by means of regimen, inasmuch as gouty subjects have been at all times singularly averse to pursuing such discipline, yet have they been quite sufficient to establish the fact of the capability; and it should be borne in mind that by no other means has the end ever been attained. The late Dr. James Gregory of Edinburgh was a signal instance of the perfect success of the regimen which he ably advocated and strenuously enforced. With a strong hereditary predisposition, gout having existed in his family for generations, and his father having been an early victim of it, he was himself seized with the disease at a very early age; but subduing it by abstemious living, he was disposed to congratulate himself on having obtained exemption. The effects, however, of slight indulgence during a casual visit to Oxford, admonished him that he could take no liberties; and from that period he abided steadily by the regimen which he had laid down for himself, the safety and efficacy of which he had proved, and by adhering to which he was never afterwards visited with gout. This account of himself he used to deliver annually to his class; and when the writer of this article heard him do so in the sessions of 1802 and of 1803, he had reached his fiftieth year without experiencing a return.

In instancing his own case, Dr. Gregory's object was not so much to adduce proof of the efficacy of preventive regimen as to show that the very spare living and bodily labour which some had inculcated, and which deterred many from attempting to pursue a rational course, were by no means requisite; but that a very moderate degree of both would, if persevered in with steadiness, fully suffice. He was accustomed to appeal, in proof of this, to his own person, the robust form and fresh complexion of which gave ample assurance of its being sufficiently nourished, and to conclude his remarks with saying, "You will allow, gentlemen, that I am no starveling."

The consideration of preventive regimen may be conveniently subdivided under two heads,—the prevention of plethora, and its removal whenever its appropriate phenomena denote its presence. For the first, it would be impossible to lay down any express rule of diet that would be suitable for all habits and constitutions; and to this head all the doctrines advanced in the article PLETHORA apply. Where there is a predisposition to gout, with a tendency to fulness of habit, great care should be taken not to minister to fulness by too much or too nutritive diet. Animal food should be sparingly taken, and fermented liquors should be cautiously avoided. The quantity of food necessary for full health and strength is very moderate, especially where bodily exertion is inconsiderable; and the majority of mankind

consume habitually far more than is good for them; whence arises a large portion of their diseases. The doctrine is unpalatable, and the physician who enforces it will hardly be a favourite with the many; but it is not the less sound; and so long as mankind persist in closing their eyes to the truth, they must suffer the consequences of their wilful blindness. When the time arrives, as come it must, that a knowledge of the animal economy shall form a part of liberal education, and each individual shall be capable of comprehending the structure and functions of his own frame, such truths will be more readily acknowledged, and physicians will have fewer obstacles to contend with in the conscientious discharge of their duties. The temperance necessary for lessening the tendency to gout has been often and ably enforced; yet, judging from the ravages daily witnessed, and from the accounts of early treatment and of regimen pursued which such sufferers report, but little progress has yet been made in establishing generally sound principles of management for gouty subjects. Nutrition is still encouraged as a means of supporting strength, wine is enjoined to keep gout from the stomach, and excesses of every kind are committed; while credit is taken for moderation merely because they are not carried to extreme, nor as far as inclination might prompt. Whatever is taken beyond what the wants of nature demand is excess; and numbers are guilty of it who are unconscious of being so. In a healthy frame the natural energies are ever active in appropriating and throwing off the redundancies, and in this way apparent health may be long preserved; but if the excess be continued, disease is sure sooner or later to result, when medical discipline, now indispensable, carries off, by one outlet or other, what the constitution can no longer endure. It is the part of wisdom to avoid this issue by maintaining habitual temperance, the practice of which will ever ensure a rich reward.

Dr. Cullen has judiciously laid down as indications of treatment in gout, to moderate the paroxysm, and to prevent its recurrence. The practice of many gouty sufferers seems exactly the reverse, namely, to hasten the paroxysm and to increase its violence, under the false impression that a severe attack eliminates and expels from the system more gouty matter than a weak one. The doctrine claims to be founded on fact and experience, yet is it eminently untrue. The fact that the accession of gouty inflammation brings relief to pre-existing constitutional derangement belongs only to the earlier seizures, and does not hold true generally of gout; and the belief of the paroxysm purifying the constitution of gouty matter in proportion to its violence resulted entirely from a false hypothesis respecting the *materies morbi* of gout, and though supported by the high authority of Sydenham, is utterly untenable. There can be no doubt at the present day, that the indications of Cullen are those which ought to be followed.

Next in importance to regulating the ingesta,

is preserving a state of free and adequate excretion. However moderate the diet, if through neglect of exercise or other causes nutritive matter be imperfectly appropriated, and excretions become defective, a loss of balance must result; the blood must become charged with both nutrient and excrementitious matter in excessive proportion, decline of health ensue, febrile excitement become aroused; and in a gouty habit such progressive depravation will be pretty sure to end either in a paroxysm, or in an abortive effort of the constitution to form one. These are the cases which have involved the subject of gout in so much obscurity, and by their equivocal character have led to the abuse of stimulant treatment. It is obvious that the state of constitution here referred to may be relieved in two ways, apparently opposite; either by exciting the constitutional powers to increased efforts for appropriating and expelling the redundant matter, or by diminishing this so as to keep it within the ordinary powers of nutrient action and excretion. On a fair comparison and just estimate of the relative value of the two modes, there can be little room for hesitation in giving a decided preference to the latter. Far better is it to prevent plethora by temperance in diet, and to promote appropriation and excretion by exercise, than to keep the energies of the frame overstrained by continued use of stimulants. The superiority would be great were we to regard only the general ill effects of continued excitement, which not only exhausts power, but creates a necessity for the stimulus to be progressively increased; it becomes far more so when we take into account the destructive lesions of important organs, to which stimulation of overcharged vessels almost necessarily gives rise. If plethora be obviated by temperance and exercise, or removed by depletion and abstinence, the several organs and functions of the frame are left in their natural and healthy state, in which the natural powers, unaided by stimulants or tonics, are fully capable of preserving them. But when it is attempted to remedy plethoric ills by increasing the energies which nature exerts for their removal, the several functions, even when successful in effecting temporary amendment, become exhausted and debilitated, their ordinary efficiency is impaired, congestions ensue, leading to local inflammation and organic lesions; and a host of maladies severe and untractable are the eventual result. By rational prophylaxis all such consequences may be effectually and certainly prevented, while daily observation too clearly shows how little they gain who combat such ills by stimulants and tonics. So long as temperance is observed, the several functions of health will be so performed as to need little assistance from art. Still, as no casual care may suffice to give full security against casual derangements, attention should be given to the several excretions, the most important of which are those of the bowels and the skin. The bowels should be kept free, and the skin perspirable; mild

aperients will serve the former purpose, active exercise the latter.

After temperance in diet, and adequate excretions, the next agency available for obviating plethora by promoting the appropriation and final expulsion of what is taken into the system is exercise, which in the prophylaxis of gout is of the highest importance. However complete and undeviating the temperance which a person threatened with gout, and anxious to avert it, may observe, the aid of active exercise will still be necessary to give the security which he seeks, and which his case admits of. Indolence in him may beget evils directly analogous to those which repletion produces, and, though modified by circumstances, leading to similar results. Whatever the sustenance taken, it requires to be expended in all of its several appropriations; and the effete matter which it continually displaces needs to be discharged from the system by active and adequate excretion. If nutritive appropriation fail in healthful energy in any of the tissues of the frame; if, through defective excretion, the effete matter continually passing through the appropriate outlets be not fully thrown off, both nutritive and excrementitious matter must accumulate in the blood in undue proportion, and induce a condition of the body generative of disease. To promote both purposes, adequate exercise is the natural agent, the use of which cannot be superseded by any medicines however valuable or however lauded. Blood-letting may remove redundant nutritive matter from the circulation; purgatives, diaphoretics, and other evacuants may succeed in rendering the excretions more active and efficient; but no sound mind, judging even by common sense, much less if at all aware of the relative effects of preventive and remedial courses of procedure, can hesitate which to prefer. It is much better not to overflow than to be obliged to empty; it is far more healthful to prevent accumulations of excrementitious matter through active exercise, for which the body is so admirably constituted by nature, than to remove them by any evacuants, however certain in their operation. The two simple terms then, temperance and exercise, convey whatever is essential in the prophylaxis of gout; and, if rightly understood so as to be strictly practised, they would be amply sufficient for all useful guidance. Further discussion could only regard the degree to which each should be carried so as to ensure its good effects without hazarding contingent evil. To pursue the subject minutely in this place would swell this article beyond its allotted extent. They who comprehend the doctrines advanced, and imbibe their spirit, will be at no loss so to regulate regimen as to produce nothing but good. It may be remarked that extremes in either respect are quite unnecessary; and the evidence of Dr. Gregory's personal experience has sufficiently shown that gout may be thus effectually prevented without extraordinary macilency, or any privations incompatible with rational enjoyment of life.

But notwithstanding all the care which the most cautious can take, irregularities of diet, interrupted exercise, and other inevitable deviations from the prescribed course, will induce occasional plethora leading to derangement of health. The evidences of this, and the means of abating it, become then the next subject of consideration. When fulness of habit begins to appear, the diet, however moderate, should be still further abridged; animal food should be more sparingly taken, fermented liquors discontinued, the bowels kept more free, and the exercise rendered more effective; and these attentions would be expedient even while the increasing fulness presented no evidences but those of health. Should they suffice, nothing more will be needed. But if plethora advance so as not to be thus removed, if consciousness of health becomes disturbed by morbid feelings, and these be accompanied by a labouring circulation; if, finally, a hot skin, quick pulse, and white tongue, denote the stage of febrile action to have commenced, then, though no local congestion or inflammation should yet have occurred, blood should be taken, purgatives employed, and the whole regimen should be strictly antiphlogistic. It may be deemed that at this incipient stage bloodletting may be dispensed with, and certainly it is not the general practice so to employ it; but this we attribute to practitioners not being sufficiently aware of the real state of constitution, nor of the great advantages derivable from early bleeding. It is true that this stage is not immediately dangerous; that it may be suffered to advance somewhat without much hazard, it being the consecutive derangements rather than the incipient plethora or febrile action which beget danger; that it may even get well, and without ulterior mischief, although bloodletting be not practised. But these admissions will not alter the question either of the real nature and tendencies of plethora, or of the remedies which most safely, promptly, and effectually relieve it. Of these remedies the most direct, and unquestionably the most eligible, is bloodletting. It removes the cause of disease more effectually than any other remedy; it more promptly restores to the several functions the healthful energies of which plethora with its consequences deprives them; it supersedes the protracted use of other evacuants; and by quickly suspending the exhausting effects of continued febrile action, it virtually preserves strength instead of wasting it. For this purpose large or repeated bleedings are never needed. A single venesection to twelve ounces, with purging and low diet, will oftentimes suffice to arrest progressive disease, and re-establish the sanative efficiency of the natural powers. And here, again, early bloodletting saves even blood, if this were an object, (and it is an object that it should never be unnecessarily nor superfluously taken;) for moderate bleeding early employed will avert severity of disease, which, where it does ensue, often demands profuse depletion to save life, and thus consigns to tedious convalescence, if the party be fortunate enough to escape a more fatal

result. It might be beneficially laid down as an axiom, that, abstractedly, bloodletting is the direct remedy of febrile action, its use and modifications being determined by circumstances. In idiopathic fevers produced by miasmata, and attended with prostration of power, its employment may be questionable, and great caution at least is required in applying it; yet when early and judiciously employed, it has proved a powerful agent in arresting the progress and mitigating the symptoms even of typhus, as the records of medicine abundantly prove. In such cases much requires to be taken into account, which the skilful practitioner will not overlook; and especially the character and tendencies of the prevailing epidemic should be allowed their full influence on his judgment. In febrile action of an ordinary character the same caution is not necessary; and here the solicitude should be not to escape bloodletting, but to discover sufficient evidences of a labouring and disturbed circulation to encourage the having recourse to it; for when timely used, the duration of disease is materially shortened, the necessity of medical discipline considerably diminished, while the constitution is spared the ravages which protracted fever, even when ultimately cured, too often entails. With these remarks on the means of preventing plethora in a healthy subject, and of remedying it when it does occur, we may now dismiss the prophylaxis of gout.

From all that has been stated in the foregoing pages of the nature and character of gout, it is obvious that antiphlogistic treatment is that which is essentially required for its cure; and were it not for the complications produced by false theories, improper regimen, and the perverted use of remedies, the establishment of this truth might almost suffice for all practical guidance. When the prophylaxis of gout shall be more clearly understood and more generally practised, these complications will decline, and simple treatment will alone be needed. But until that happy day shall arrive, it must be necessary to specify the various practice required, so as to mark its adaptation to the several varieties of constitution, stages of disease, and morbid complications, which are sure to present themselves for a long time to come. On the practical instructions which follow we wish to observe, that, however they may seem to flow from the principles laid down, they have not resulted from merely speculative views, but are supported by the best experience of the profession, as handed down by distinguished writers for ages, and are established to our own firm conviction by all that we have ever seen of the disease or its treatment.

A first attack of gout affords, of course, no opportunity for prophylactic treatment. It comes on, if not unannounced, at least unexpectedly, the party being first warned of it by the actual seizure. The treatment of the paroxysm, therefore, in its simplest state, becomes the first subject of practical illustration. There can be no doubt that the more this is treated

on general principles, and the less the special nature of the disease is heeded, the more prompt and effectual will be the relief given, and the more perfect the correction of that morbid condition of the system in which the attack has its origin. If there be a full habit, with active fever, as marked by a full and frequent pulse, hot skin, and white or loaded tongue, then bloodletting, purging, and antiphlogistic treatment should be employed as freely as if the fever and local inflammation passed under any other name. In mild attacks and where constitutional disturbance is less strongly marked, such active treatment may, perhaps, be waived, and the tendency to spontaneous subsidence already noticed, be trusted to without immediate ill consequence resulting, especially if, after this admonition, a prophylactic regimen be steadily pursued. Still, however mild the attack, except it take place in a broken constitution, or under circumstances decidedly adverse to direct depletion, we would deem it wise practice to take some blood, so as to render more complete the purposes for which nature institutes the paroxysm. Of this treatment of a first paroxysm we certainly cannot adduce cases; but as in more advanced gout we have bled freely, both on the approach of the paroxysm, at its height, and on its decline, regarding only the state of constitution, and not the special malady, and this not only with perfect safety, but with eminent advantage, we feel fully justified in applying to a first attack of gout the principles which we would not hesitate to follow at later periods, and under circumstances less favourable to their full and beneficial operation. It has been seen that the simple paroxysm runs a definite course, terminating in a few days in renewed health. And if the gouty effort be slight, and the existing plethora inconsiderable, this alleged restoration of health may be so complete as to need no interference from medicine. But if there be much plethora, then the fever aroused may not subside on the gouty nîsus having effected its purpose of establishing a local inflammation. The pulse may remain high, the skin hot, the tongue loaded, with the various other depravations usually attendant on a febrile state. Under these circumstances no question can arise on the propriety of effecting by art what nature fails to accomplish. Bleeding, purging, cooling salines, with antimony, and low diet, should all be employed in proportion to the acuteness of the symptoms, and the constitutional energies displayed. But whatever hesitation there might be in interfering with a first paroxysm, on the ground of its not being needed, and of nature being equal to accomplishing her purpose, there can be none, when the disease recurs in a constitution otherwise healthy and vigorous, in resorting to the same constitutional treatment which would be applicable in any other active inflammation. The plethora and inflammatory action are abundantly demonstrated by the attendant symptoms, there being a full, strong, bounding pulse, with hot skin, white tongue, and all the concomitants of

active fever. The local inflammation, so far from militating against the employment of active practice, affords additional reason for promptly resorting to it; for if not speedily allayed by suitable depletion, severe pain is unnecessarily prolonged, disorganization is hazarded, and greater debility of parts ensues, with more impeded motion of joints, and more tedious convalescence. On the accession, therefore, of the paroxysm in an otherwise healthy subject, if no earlier opportunity be afforded, a full bloodletting should be employed, and the bowels should be freely purged with a competent dose of calomel and colocyath, followed by a saline cathartic. If these means succeed in making impression on the system so as to reduce the pulse nearly to the healthy standard, the general fever may be treated by saline antimonials and aperients, like any other febrile excitement. Should the pulse again rise in frequency, force, or hardness, with renewed heat of skin and whiteness of tongue, the bleeding and purging would require to be repeated. The only distinction which we know between such an attack and any of the simple phlegmasiæ, regards the topical applications; for so long as the local inflammation is removable by constitutional treatment, topical remedies should not be employed, unless demanded by an urgency of suffering, such as, when constitutional treatment is properly employed, will very rarely occur. The local inflammation has a natural tendency to subside, as has been stated; and it is perfectly justifiable to await this, at least for the usual period, without resorting to topical remedies. When it lingers, the fault lies not in the joint, but in the constitutional state, which keeps up the inflammation, and to this state are remedies best directed.

There is a distinction, both in the febrile state and local inflammation, that deserves to be noticed. Both to a certain extent belong to the paroxysm, constituting it and subsiding with it; but both may continue beyond the time when the paroxysm, running its natural course, would spontaneously subside; and this is dependent, not on the gouty nîsus, but on the constitutional condition. Relieving this condition by depletion and febrifuge regimen will subdue disease in both respects. If the local inflammation, however, have been suffered to establish itself, it may keep its ground even after the plethora and febrile action have been sufficiently abated; and here it is that local treatment may be needed for expediting and completing the relief of the inflamed joints, and averting these structural lesions which protracted inflammation is sure to occasion. To abstract blood locally before the general circulation is sufficiently unloaded, gives no effectual relief; for if the constitutional state be not corrected, the local inflammation, however it may be allayed by topical bleeding or cooling applications, is pretty sure to recur, while some risk is incurred of the inflammation being transferred to some other joint, if not to some vital organ. Leeches, therefore, though their use is sanctioned by high authority,

should assuredly not be employed in the ordinary treatment of the paroxysm, nor until the continuance of local inflammation after the removal of the constitutional disturbance manifests that the local disease has acquired an independent existence. In this state leeches and other local remedies may be safely and beneficially applied, but antecedently to it their use is not appropriate. If leeches be unsuited for what may be strictly regarded as the paroxysm, repellent applications are still more so; and though in slight cases they may appear to succeed, their use as a general remedy for gout is eminently hazardous. If the constitutional treatment be conducted as it ought, they will be rarely needed; and far better is it that the local inflammation should yield to the constitutional correction, than that it should subside under local remedies. In the one case its decline affords evidence that radical relief is obtained, an assurance which must be incomplete when topical treatment is trusted to, however successful it may in any particular instance prove. That the final cause of a gouty paroxysm is the relief of the system, and that it accomplishes this to a certain extent, are truths sufficiently established; and if the relief were complete, the interference of art would be superfluous and improper. But there is strong reason for believing that the paroxysm does not sufficiently relieve the surcharged system; and hence the assistance of art becomes necessary for seconding the operations of nature. But this assistance requires to be directed to the constitutional state rather than to the local ailment. So much is effected by the gouty effort, whatever its intimate nature may be, that it would be unwise to interfere with it otherwise than by removing the necessity which incites it. This may always be safely done by abating plethora and restoring general health; but until this precaution be taken, it cannot be expedient nor always safe to arrest suddenly the local malady by local bloodletting or repellent applications. As subsidiary to the constitutional treatment, there can be no objection, in highly nervous temperaments, and where inordinate sensibility prevails, to sooth by cold or tepid sponging, or by any equally harmless adjuvant; but as was before remarked, if the constitutional treatment be adequately employed, such remedies as these will be little needed. In treating the paroxysm of gout, the indications are to relieve the constitution, and to moderate the local inflammation, so as to prevent the disorganization to which its violence or continuance would give rise. Both are best fulfilled by the constitutional treatment already directed. The converse of this practice, or that which, disregarding the constitutional derangement, directs its efforts to subduing the local inflammation by any means capable of producing such effect, has been at times confidently advised, and was revived with high commendations some years ago, but no treatment can be more hazardous nor more at variance with sound pathology. By promptly relieving the paroxysm through means of constitutional treatment, suffering is abridged,

danger averted, convalescence accelerated and rendered more perfect, the recurrence of disease obviated so as to be thoroughly capable of prevention by prophylactic regimen, and at least rendered more distant; and the gouty diathesis, which the long continuance and repetition of paroxysms invariably strengthen, is weakened and suspended. Were incipient gout always treated on these principles, and the premonitory signs which give notice of its recurrence detected in sufficient time to employ the depletion and abstinence necessary for averting the paroxysm; and were prophylactic treatment afterwards pursued to the extent and with the steadiness necessary for ensuring its effects, the victims of reiterated gout would be few, and the disease would soon cease to be the opprobrium medicorum which it has been so long considered.

It must be borne in mind that the foregoing remarks and practical instructions apply to gout as occurring in its simplest form, and in a constitution otherwise healthy and of unimpaired vigour. When it arises in a habit naturally feeble, vitiated by other diseases, or injured by repeated accessions of gout itself, the treatment, though similar in principle, must yet be greatly modified; and on the accuracy with which the necessary measures of relief are adapted to the existing powers, and suited to the concomitant derangements of function or structure, will the ultimate success depend. The perfect health of each and every function should be the standard by which all deviations should be judged; and the endeavour should be to restore severally, and by the treatment appropriate to each, whatever may appear disordered. Far preferable is this simple and intelligible proceeding to regarding any symptom as characteristic of gout, and applying to it some supposed specific, without reference to the direct operation of the remedy, or the physiological changes which its administration effects. Abiding by such a standard, which has the advantage at least of being real and definite, and ceasing to connect both symptoms and remedial effects immediately with that conjectural and indefinite entity, a nosological disease, practitioners would in all diseases see their way more clearly, and proceed more directly and effectually to their object. Such mode of observing disease, too, would render the misconceptions and discrepancies of practical writers harmless, and enable the practitioner to unravel any complication of symptoms however intricate. As diseases are too much regarded in their complex and individualized character, so is it too much the habit to view the operation of remedies in connexion with the more remote curative effects, rather than with their more direct influence on physical functions. The former mode leaves out of view much that requires to be intimately known, and may well be characterized as empirical; the latter alone can lead to just and accurate conceptions of morbid actions and remedial agencies; and in proportion as it takes a lead in guiding the practitioner's treatment, is his practice entitled to be considered rational and scientific.

Some correct views on this subject have lately been presented by Dr. Spillan of Dublin, in a small volume entitled "A Supplement to the Pharmacopœia." Even where remedies evince what is deemed a specific operation in the cure of certain diseases, their effects can be very generally resolved into their primary and direct influence on certain functions of the frame, and their curative agency be thus satisfactorily accounted for. This, at least, should be attempted in all cases of alleged specifics, although, however minute and accurate the investigation, something will ever remain undisclosed in the properties of each drug, to give it its peculiar character, and distinguish it from others of the class to which it belongs. Rhubarb, jalap, aloes, colocynth, are all purgatives, and with a view to their purgative effect are they principally employed; yet practitioners discover grounds of choice which lead to selection and preference independently of their relative strength as purgatives. When they are administered, however, it is the purgative operation that is sought for, and through this operation the curative effect is expected. It should be so with all remedies so far as our knowledge of their direct agency admits. To this agency we should more particularly direct our attention, at the same time that we avail ourselves of every advantage which unexplained properties may afford in combating diseases. A specific for gout has always been considered a desideratum, and mankind have ever been deluded by the vain hope that one would be discovered. Absurd as is the search pursued with this view, it has conferred one advantage at least, by making us familiar with a medicine which, though not entitled to be called a specific, is yet highly valuable, not only in gout but in almost all inflammatory diseases. The medicine to which we allude is colchicum, and from a tolerably extensive employment of it for several years, we can faithfully add our testimony to the several records which attest its virtues and utility. When we were first induced to make trial of it, we took some pains to ascertain by close observation its real powers, and the best mode of administering it; and as our subsequent experience has made no change in the conclusions at which we then arrived, we cannot do better than transcribe here the account which we rendered of it in a small volume published in 1822. "A full dose of this medicine purges copiously, allays pain, and lowers the pulse. These effects are produced with greater certainty if the fulness of circulation be previously reduced by bloodletting, and the mucous secretions of the intestines evacuated. When inflammation is high, as marked by a strong bounding pulse, hot skin, and loaded tongue, bloodletting should always precede the use of colchicum. But in cases where arterial action is more moderate, and direct depletion from any cause questionable, this medicine may be resorted to with peculiar propriety and eminent advantage. Its operation seems to combine the several advantages of bleeding, purging, and sedatives,

and is therefore particularly adapted to those cases where active depletion is inexpedient. In treating hereafter of the several modifications of gout, in so many of which venesection must be sparingly employed, or wholly withheld, I shall have occasion to recommend the free employment of this valuable remedy. And as the forms in which this medicine is given, and the modes of administering it are of much importance, I shall fully explain my own practice in both respects, without presuming, however, to limit the application to those methods which I have been led to prefer. Various preparations and different modes of exhibition may, in the hands of other practitioners, be quite as salutary as those which I employ; for as I observed on a former occasion, the effect, not the form, of prescription deserves regard. The preparations which I have tried are the vinous tincture of the root, the vinous and spirituous tinctures of the seeds, and the powdered seeds. Of these I decidedly prefer the tinctures of the seeds, as being more uniform in strength, and more certain in operation. It might be reasonably expected, from the virtues of colchicum being found to reside in the seeds as well as in the root, that the former would yield a medicine of greater uniformity, being in a state of more perfect and determinate maturity, requiring less care in the collection and preservation, and being less liable to have their powers impaired. My experience of the several preparations fully confirms this supposition.

"It has been already remarked that colchicum purges, abates pain, and lowers the pulse. Its sedative powers, though sensibly connected with its evacuant, are not, however, wholly dependent on them. The motions produced are copious, frequent, and watery, and the operation seems more analogous to that of the saline purgatives than of any other cathartic. The number of motions is sometimes considerable, without any proportionate depression of strength ensuing. I have known even twenty stools occasioned by a dose of colchicum, the patient not complaining of the least debility.

"These circumstances will guide our employment of this medicine as a remedy for gout. Where the plethora is considerable, undoubtedly bloodletting should precede its use, for colchicum seems to remove the more fluid parts of the blood only; and these being quickly renewed, the relief obtained by this medicine alone cannot be so perfect or permanent as when bloodletting is also employed. Though the sedative powers of colchicum are valuable assistants to bloodletting in abating arterial action, they are yet no perfect substitute for this remedy in cases of high inflammation; neither are its evacuant qualities capable of superseding those cathartics which expel mucous secretions. In cases, then, of active gout occurring in a full habit, we would invariably bleed, and purge with calomel and antimony before having recourse to colchicum. It is possible that colchicum might occasionally diminish pain and abate inflammation more speedily if administered earlier; but it should never be forgotten that in the treatment of this and all other

diseases the important object is not to allay pain or combat symptoms, but to restore general health with the least possible injury to the functions or structure of particular parts. In this respect the physician's province seems analogous to that of the Roman dictators, who were appointed, not to combat an enemy nor quell an insurrection, but to take care that the commonwealth received no injury. In like manner the physician should provide not for the relief of a mere transient or other incidental ailment, but should so conduct the disease to its termination that no permanent injury be inflicted on the constitution. Unhappily, far from being left to the uncontrolled exercise of his judgment in accomplishing this end, he is too often compelled by prejudice and caprice to adapt his practical treatment, not to the real nature of the disease, but to the preconceived notions, impatience, and ignorance of those by whom he is surrounded. When colchicum is to be employed, it may be given either in full doses so as to purge actively, or in divided doses frequently repeated. A drachm, drachm and a half, or two drachms, of the tincture of the seeds should be administered at night, and repeated, if necessary, next morning. This quantity will generally purge briskly, but if it fail, a third dose the following night will be pretty sure to succeed; at least I have seldom found it necessary to exceed these doses. The full operation being thus obtained, I usually continue its use in smaller doses, ordering twenty minims three times a day in any of the common saline mixtures. Even this dose will occasionally purge so actively as in a short time to require its discontinuance, in which case the antimonial salines should be given without it, so long as febrile symptoms render necessary."

Such were the views which careful observation of the properties and medicinal effects of colchicum led me to form ten years ago, and it is somewhat in proof of their accuracy that a tolerably extensive use of the remedy in the intervening period has induced no change in them, while it has increased our confidence in the efficacy and utility of the remedy when used as an auxiliary to more active and direct treatment. What might be regarded as its specific powers seem resolvable into those more simple and direct influences which it exerts on the animal frame. It purges, allays pain, and lowers the pulse. These effects are accounted for by assigning to it a cathartic and sedative operation, and it is this combination perhaps to which its peculiar virtues are to be ascribed. The reduction of pulse might appear a result of its purgative operations, but it can without purging lower the pulse. That it possesses sedative properties is abundantly shewn by its effect in allaying pain, and this where no purging is occasioned; and, so far as we have been able to observe, we should consider the reduction of pulse as produced by its sedative rather than its evacuant properties. We are also disposed to regard the sedative properties as those from which it derives its chief value. These discus-

sions are important, as they assist in reconciling the discordant testimonies which are still offered on the subject, and when finally closed, will establish that discriminating use of the remedy which will ensure its fullest advantages.

It has been alleged, repeatedly and on highly respectable authority, that colchicum does no good unless it purges. This we disbelieve, because our own experience contradicts the fact, and because it is inconsistent with what we have witnessed of the other properties possessed by colchicum. On the principle of a purgative effect being required, several practitioners combine the remedy with purgatives, and with advantages well calculated to confirm the propriety of so doing. This mode we repeatedly tried in our early use of the medicine, but saw no inducement to pursue it. On the contrary, if we had a difficulty in exhibiting colchicum, it arose from its too great readiness to purge, and the consequent necessity of relinquishing it. When we need its availing powers in allaying the inflammation of gout, rheumatism, or any other disease, we are always best pleased when it does not speedily purge. In other words, we look for benefit more to its sedative than its evacuant operation; the latter can be supplied by other and better means; in the former it possesses advantages peculiarly its own. The explanation of these different opinions is not difficult: it must be sought in the views of those who administer the remedy, and the practice which they conjoin with it. If it be used as a specific, and without previous bloodletting, then we can readily understand that unless it purge it will be of little avail; but if the pulse be lowered by adequate bloodletting, and the bowels cleansed by calomel and colocynth, we would then say that a purgative effect from the colchicum itself is not needed nor at all essential to its beneficial operation. For the active gout of vigorous habits we would not give colchicum in full doses, or with a view to purge, but we would bleed and purge as in the ordinary treatment of the phlegmasiæ, and then conjoin colchicum in small doses with the ordinary febrifuge salines. Even when given in this way it will oftentimes purge actively, and, as we consider, to a disadvantage; for when it begins to excite the bowels, it must be at once relinquished, the continued irritation becoming intolerable, and, as we suspect, not very safe, although, having ever been cautious, we have never witnessed an instance of mischief thus occasioned. The views here presented we would wish to be scrutinized, for if correct, they would lead to a use of the remedy more precise and direct than yet obtains, and encourage practitioners to profit by its aid even when no sensible effect is immediately produced by it.

And here we cannot resist offering a remark which appears to merit attention. In former times, the *Materia Medica* was encumbered with a mass of frivolous and inert medicines, and thence rendered so unwieldy that some retrenchment became indispensable. The more worthless were cut off with no sparing hand, and it may be doubted whether some were not thus expunged from the list which might have

been beneficially retained. However this be, there sprung from this kind of investigation a scepticism respecting the virtues of all medicines which did not evince a direct and determinate influence on some function or other of the frame. The same feeling carried into practice demanded that each dose of a medicine should produce a sensible effect, and from this tendency it is that we think error has sprung. Although in active and urgent disease, requiring prompt relief, we would employ the full and adequate agency of remedies, yet in a large portion of medical practice, and especially where long established or habitual morbid actions are to be corrected, we are persuaded that more good results from their more gradual and oftentimes imperceptible operation. When morbid actions have continued for a certain time, and still more where structural changes have commenced, the organs and tissues concerned are not capable of sudden change, nor can they by any activity of treatment be brought back immediately to a healthy condition. As the morbid change is gradual, so also must be the corrective process, whether instituted by nature or promoted by art. In effecting it nature is ever slow and deliberate, and in this respect art would oftentimes do well to follow her example. When it is once ascertained that a medicine does possess active properties, it should not be suspected that these should be evinced by every dose of the remedy administered, nor should it be concluded that the remedy is inert merely from the absence of immediately sensible effect. This consideration would be to us a sufficient reason for placing a certain confidence in small doses of colchicum, even if we looked only to its specific or curative effects. When we regard the simpler properties into which these effects are resolvable, we are still more confirmed in the propriety of not withholding such doses on the mere ground of their not acting on the bowels.

Many remedies are continually administered from confidence in their accustomed properties, without an immediate or directly sensible effect being expected. Antimony is conjoined with salines to render them more febrifuge, and the effect is expected to result from its primary operation on the stomach; yet the evidence of nausea is not always insisted on, nor is it inferred, from the absence of nausea, that the antimony is useless. When the primary operation of colchicum comes to be better understood, it will be given in imperceptibly operating doses, with as much confidence as is now felt in the exhibition of antimony.

By the treatment prescribed in the foregoing pages the paroxysm of gout may be promptly and effectually relieved, the constitution re-established, the powers of the affected limb preserved, and the gouty disposition diminished. A due attention to prophylaxis may afterwards prevent its ever recurring. The value of such practice is most conspicuously displayed when contrasted with the negative treatment so generally resorted to, by which the paroxysm is greatly prolonged, the constitution very imperfectly relieved, the structure of the joints sooner or later utterly disorganized,

and the gouty diathesis confirmed and rendered inveterate. If gout were always of an active character, and confined to constitutions naturally vigorous, it is highly probable that the medical treatment would never have been perverted so egregiously as it has been. But this disorder occurs under every condition of health, and in all degrees of animal power, from the highest vigour to that helpless debility which can scarcely generate a paroxysm. Cases of this latter description will not bear active discipline; if employed, the patient must sink rapidly under it; and the danger arising from such maltreatment has no doubt been often the means of exciting an alarm well calculated to make a deep impression on those who are more peculiarly liable to this disease.

The too frequent error, too, of prescribing for the name of a disease rather than its peculiar condition, may have oftentimes caused extensive injury to result from ill-judged activity of practice, and thus have contributed to bring this method of treating gout into disrepute. Be the causes what they may that have so often occasioned active practice in gout to be resorted to by practitioners and again abandoned, it must be evident that, if this disease in its simplest form and highest intensity is so essentially benefited by the measures here prescribed, a modification of the same practice must, upon every principle of sound reasoning, be applicable to all inferior degrees of the same malady. From this conclusion not even the most timid need take alarm, for as the circumstances of each case sufficiently indicate what evacuations may be safely employed, no rational practitioner can ever be tempted by the doctrines here maintained to carry them beyond the point of safe and salutary endurance. Indeed there are many strong inducements to keep far within it; and provided the principles of treatment be not compromised from vain apprehension or too great pliancy of disposition, we should not be anxious in a great number of cases for the practice to be carried to the utmost limit of even safe and salutary employment; for as medical aid must necessarily be administered by men of various capacities and acquirements, all of whom may not be equally qualified for adapting accurately, in the details of practice, what principles enjoin, it will be the safer course to fall short somewhat of that activity which would most effectually relieve, rather than run any risk of exceeding it. These prudential considerations will have their full weight with every practitioner however enlightened. The more intelligent and experienced will of course feel more confidence in their own powers of accurate discrimination, and will pursue proper means with greater energy and less hesitation. All, however, must yield occasionally to prejudices long established, and to fears which the sensitiveness of friends cannot always relinquish or control. But the practitioner will give way to such impediments with greater safety to his patients and more satisfaction to his own feelings, by keeping steadily in view the principles here inculcated, and regulating his practice in

modified obedience to their clear and forcible dictates.

Before dismissing the consideration of the simple and active paroxysm, a few points more are to be noticed. It has been remarked that in the local inflammation two stages may be occasionally distinguished, one being primary, the product of the paroxysm, running a determinate course and spontaneously subsiding; the other secondary, dependent more on the general inflammatory diathesis than on the gouty nîsus, and tending not to spontaneous decline, but to disorganizations destructive of the mobility of the joints, and leading to eventual decrepitude.

Under the natural course of the paroxysm, and especially when the violence of this is subdued by suitable constitutional treatment, the first or purely gouty inflammation needs no local applications. The secondary requires direct and suitably active treatment for its removal. Leeches, cold or tepid lotions, and eventually blisters may all be necessary. On this head it may suffice to remark that the safety and efficacy of such local treatment must ever be proportionate to the relief antecedently given to the general constitution. If the constitutional derangement be corrected, the gouty nîsus will not recur; and the secondary inflammation may be subjected to ordinary and appropriate treatment without hazard of metastasis either to other joints or to vital organs.

So soon as decline of inflammation, whether primary or secondary, permits, early return to moderate exercise is of the first importance. It becomes then the best agent in restoring free circulation to the several weakened tissues, in obviating morbid depositions, and promoting the absorption of whatever may have taken place; thus preventing the thickening of ligaments, rigidity, and the contractions so apt to ensue, and enabling the party speedily to enter on the more active exercise which prophylaxis enjoins. And the precept is the more to be relied on, as it applies equally to other articular inflammations from whatever cause they arise, whether rheumatism, accident, or any other. Provided the cavity of the joint be not involved, (and in a large proportion of cases the inflammation is wholly exterior to it,) protracted rest is injurious, and the source of much mischief. Under it parts become rigid, of which early return to exercise would preserve the flexibility; depositions take place, producing permanent thickening of ligaments, or loading the bursæ of the tendons with glairy mucus, in either case impeding motion. The muscles too, consigned thus to inactivity, in time waste and become enfeebled; and eventually complete decrepitude with broken health ensues. From what has been said respecting the prophylaxis of gout, it must be evident how sedulously every source of impeded motion should be avoided by gouty patients whose joints have yet escaped disorganization. Such patients have themselves remarked that, when compelled by circumstances to use their limbs early after a paroxysm, they have recovered

with less impaired powers than when they have been enabled to indulge in rest. The principle is unquestionable, and no sensibility to slight pain, nor any vague apprehension of renewing the paroxysm, should be suffered to prevent the early renewal of moderate exercise, so necessary for promptly restoring the mobility of the joints, and preserving to the individual the power of still further re-establishing his health through their instrumentality. The attenuated limbs of gouty and rheumatic subjects are more owing to suspended exercise than to any effect of the special maladies. So convinced are we on this point, that we would in our own person infinitely prefer hazarding a renewed paroxysm either of gout or rheumatism, to encountering the manifold evils which protracted rest is sure to occasion.

Only one source of constitutional derangement has been hitherto noticed in this essay as connected with gout, namely, that which arises from excess of nutritive matter in the blood. Another no less important requires now to be discussed, as materially concerned in the several modifications of gout which are yet to be considered. It is the vitiation of blood which arises from the excrementitious matter continually carried back to it by the absorbents, not being adequately excreted and expelled. Health requires that the nutritive matter taken into the system should not exceed what is needed for the due nourishment of its several parts, and also that it should be duly appropriated to all the structures which compose the body; it also requires that the effete matter, which, having done its duty, is displaced by the nutritive particles deposited, and which in the ordinary course of animal functions is carried back into the blood, should through the admirable agency provided by nature, be from thence regularly and adequately discharged. If nutritive matter be taken in excess, it either increases the bulk of the body beyond the bounds of full activity and vigour, or, producing excitement tending to its own appropriation or removal, but also if too long continued generative of disease, it begets a state of fever or inflammation more or less active. On the contrary, if the excrementitious matter be not adequately expelled, it accumulates in the blood, vitiates its quality, and depraves the nutrient and other secretions, thus impairing by a slow and insidious process health and strength, and laying the foundation of a direful class of chronic maladies. Temperance in diet is the only safeguard against the former, but it is a certain one; exercise is also necessary for obviating nutritive plethora, by promoting the healthful appropriation of the nutriment taken, while it is the chief means of keeping in due activity the several excretory processes by which the effete matter of the system is eliminated and expelled. Of excrementitious redundancy only a brief account can be rendered in this place, the fuller discussion being more appropriately given in conjunction with PLETHORA, with which it is so continually intermixed.

As excess of diet gives rise to nutritive

plethora, and as deficiency of exercise both contributes to the same end by retarding the appropriation of the nutriment supplied, and promotes further vitiation of the blood by loading it with excrementitious particles, it is obvious that the two states of redundant nutritive matter and accumulated excrementitious particles may co-exist in every conceivable proportion. As each in its simplest state is characterised by its appropriate phenomena, the several combinations admit of being detected by enlightened and diligent scrutiny; and to this end would enquiry be far more profitably directed than to searching after specific agency in drugs for correcting evils which, having their origin in a primary depravation of the source of all nutrition, can never be radically cured but by means corrective and preventive of the primary mischief which occasions them. These pathological views point out the high importance of temperance and exercise as means both of preserving health and correcting disease. So far, at least, as the former purpose is concerned, all theories will concur in this recommendation, which is too firmly founded on common sense to be shaken by any speculation, while the advance of true pathology will maintain the equal importance of bearing the principle in mind in combating diseases.

From not being provided with a better term, we have on former occasions designated the accumulations of excrementitious matter in the blood as excrementitious plethora; and though we like not the name, we must continue to employ it. We do so with less reluctance from the necessity which exists for considering both nutritive and excrementitious plethora in conjunction, their various intermixtures being such that it would be impossible wholly to sever the discussion of them. Some future day, when the pathology of the blood shall receive the attention which is pre-eminently due to it, better terms than either can be readily substituted.

Gout being a disease no less of indolence than of repletion, it is manifest that its subjects are among those whose blood is vitiated by retained excrementitious matter as well as by redundancy of nutriment; and this consideration explains why mere abstinence, unassisted by active exercise, can never be expected to eradicate gout. Though the diet be temperate, yet indolence begetting general languor of frame, and this languor being confirmed and perpetuated by the effects of excessive excrementitious matter, causes a languid and imperfect appropriation of whatever sustenance is taken; a degree of nutritive plethora thus relatively ensues, and the elements of acute disease are thus supplied. To distinguish both states and their multiplied combinations, it becomes necessary to display their separate conditions, and by contrasting them with each other, to furnish indications by which the prevalence of either, or the intermixture of both, may at any time be detected.

The phenomena of nutritive plethora, its increase, and final transition into a febrile state,

have already been sufficiently described. Excrementitious redundancy in the blood begets a very different condition, but one no less marked by its appropriate indications. These are a sallow aspect and dusky skin, the pulse low, soft, and easily compressible, the surface of the body for the most part harsh, dry, and obviously deficient in natural transpiration, the tongue moist, clean, red; the appetite capricious, often craving, with an endless train of dyspeptic ailments; the alvine discharges inveterately foul, dark, slimy, pitch-like, and exhibiting no traces of healthy fæces; the urine high-coloured, often fetid, and depositing more or less of sediment: these several evidences, or a certain portion of them, with decline of flesh and strength, are sufficiently characteristic of this state. The condition itself we believe to arise from imperfect elimination of excrementitious matter; and the depraved state of the several excretions we regard as resulting from the laboured though inadequate efforts of the constitution to accomplish its own purification. How much this state is combined with the more advanced and complicated conditions of gout will be readily perceived; and it is by bearing in mind this source of vitiation, as well as that furnished by nutritive plethora, that the treatment will be most judiciously and successfully conducted. The direct effect of excrementitious plethora is unhealthiness of nutrient secretion, producing feebleness of the organs thus imperfectly nourished, and progressive decline of strength. The efforts of the constitution to throw off this oppressive load fail of success, and their ineffectual renewal, as well as the progressive unhealthiness of nutrient secretion, cause still greater feebleness, and eventually attenuate the frame.

According as more or less of nutritive plethora becomes combined with this state, the constitutional efforts are greater, and various degrees of febrile and inflammatory excitement ensue. In proportion as this excitement is energetic, and as suitable means are employed to relieve it, is the vitiated state of the blood corrected, secretions and excretions are improved, and general health and strength are renewed. Increased secretion from the bowels seems the principal discharge by which nature in general aims at getting rid of such impurities, and to promote them by suitable purgatives is clearly indicated, care being taken at the same time to support strength by light yet nutritive diet. When relief to a certain extent is thus afforded, the powers of the constitution rally, and a febrile effort is made to assist in the work of purification. As this advances, depletion requires to be more active, and the diet less stimulating. When sufficient excitement is aroused to warrant the employment of bloodletting, we may then consider the curative process in the most favourable train. Perhaps the powers of the constitution are hardly adequate to rectify any high degree of this peculiar derangement, without the agency which febrile excitement supplies; and hence we see experienced practitioners often hail the

appearance of febrile symptoms in chronic complaints, as announcing a more remediable form of disease.

These remarks on excrementitious plethora, though cursory and imperfect, will suffice to prepare the way for the remaining discussion of gout. To pursue this methodically through all the alleged varieties would be both tedious and valueless. If the principles be clearly laid down, there can be little difficulty in applying them to whatever variety or complication of the disease may present itself.

On a first accession of gout it should be the inflexible determination of the party assailed never to subject himself to a return. That this is practicable is abundantly proved; and if the means so clearly pointed out be not employed, blame should not be imputed either to the inveteracy of the malady or the imperfection of medical science. Nature has endued all matter with determinate properties, and living beings are subjected to certain organic laws, by obedience to which health and physical welfare are maintained, while a violation inevitably begets disease. They who will neither learn those laws, nor abide by them when proclaimed, must suffer the penalties of their own ignorance and perverseness.

When successive attacks of gout have taken place, the hope of effecting complete exemption must be sensibly weakened. Still, if there be no disorganization, the end may yet be attained, and at all events the attempt to accomplish it will be amply repaid; for should attacks recur they will be slight, at long intervals, easily subdued, and will commit no ravages, but leave the general health and even the gouty limbs tolerably sound.

Disorganizations of course enhance greatly all the difficulties. They evince a more confirmed gouty diathesis; the local weakness encourages renewed seizures from slight causes; and the impediment to active exercise cuts off one of the most efficient prophylactic agents. In this state of gout, then, too much should not be attempted, either by bloodletting or abstinence. Active symptoms should be met with such certainty of practice as the accompanying state of constitution may warrant. Fever should be allayed, local inflammation abated, and general health restored as speedily as possible; but all due regard should be given to the degree of constitutional power existing.

In the wretched cases of extreme disorganization, broken health, and exhausted power, no one would think of employing any but palliative treatment; but even this will be beneficial in proportion as it is guided by the principles maintained throughout this essay. So long as there is encouragement to employ bloodletting as part of the treatment, will benefit result from resorting to it. In cases in which the danger to be apprehended from its use is greater in degree than the expectation of benefit, other means must be substituted; and here colchicum is of inestimable value, sup-

plying the place of more active and efficient treatment better than any other drug with which we are acquainted.

As a healthy state of each function is the standard with which the several derangements should be compared, and which it should be the endeavour to restore, care should be taken to ascertain by direct evidences that each is actually restored to the efficient exercise of its powers. The pulse, skin, and tongue, will demonstrate with sufficient accuracy whether fever is subdued, and will thus afford evidence of the circulation being, for the time at least, restored to its healthy balance. To maintain this ground, however, assiduous care should be devoted to the several excretories, all of which should perform adequately their several functions. The skin, bowels, and kidneys should be active, and their respective efficiency should be attested both by the quantity and quality of their several excretions. Each of these should receive more continued attention than is usually given to them, for if duly noticed, they would announce the advance of disease long ere depraved sensation or other prominent derangement indicate its approach, and would thus lead to a more timely and effective use of suitable correctives.

A closer attention to them, also, during convalescence, would contribute much to render recovery more perfect, and lessen the liability to renewed attack.

The skin should be active, for it is an outlet for the discharge of excrementitious matter of the highest importance. The most effectual and salutary means of keeping it so is active exercise. Warm bathing is a valuable assistant, and eminently so when but little exercise can be taken. The condition of the skin itself should be regarded. In many, large portions of its surface are hard, dry, scaly, and utterly impermeable. These should be restored by warm bathing, by such applications as soften the cuticle, and by frictions both with the hand and the flesh brush. The thorough desquamation of cuticle effected by the process of the Russian vapour-bath, would be a valuable means of restoring many an imper-spirable skin to the full exercise of its functions. A freely perspirable skin is powerful in obviating plethora both nutritive and excrementitious.

The bowels should perform effectually the duty which nature assigns them, and in this respect attention is much needed, for considerable depravation is continually suffered to go on unchecked and unheeded. The amount and frequency of stools are too much trusted to as evidences of healthy bowels, while the only one to be relied on is the character of the matter discharged. When this, however sufficient in quantity or regular in discharge, is dark, foul, and charged with mucus, evacuant or alterative medicine is needed, however free the party may be from every other symptom of disease. By this neglect much disease creeps in, and many a constitution is undermined where timely and judicious

attention to the bowels would avert all the mischief.

In like manner the urine merits attention, and more especially from the tendency which there is in gout to throw off morbid matter by this outlet. Much profitless scrutiny has been devoted to the different impregnations, the specific gravity, and other properties of gouty urine. The main fact respecting it is that it contains what ought not to find its way into it, and the most effectual way of purifying it is to cut off the morbid supplies by regulating the diet and restoring due activity to the other excretories, for it is their deficiency which throws upon the kidneys so much extraordinary labour. Light diet, a free skin, and active bowels will clear the urine with little aid from chemical correctives. These are, no doubt, proper as adjuvants, where high degrees of acescency or of alkaliescence prevail; but they are utterly inadequate for perfect corrections, and their use at best, if alone trusted to, is uncertain and short-lived. We have no evidence that when taken by the mouth they ever reach the bladder so as to act on the concretions deposited there. This truth the history of calculous complaints establishes. From the same source we learn that when acid calculi cease to be deposited in consequence of the free use of alkalies, if these be continued, alkaline depositions take place, and thus the evil is changed, not removed. Both in calculus and gout our belief is that more may be done in correcting the morbid state of urine, by re-establishing a healthy balance in the constituents of the blood, avoiding all excess of diet or stimulants, and keeping up an active state both of cuticular and intestinal excretion, than can ever be effected by neutralizing remedies. These should not be withheld, but from the circumstance before mentioned caution is required in their use, and at all events they should not, however efficient they may casually appear, be suffered to supersede the far more effectual relief which rectifying the fundamental errors of the constitution is capable of affording.

Little more is needed to complete the discussion of gout, the principles maintained in the foregoing pages being applicable to all the forms in which the disease can present itself. It has been already stated that these complex conditions and alleged varieties are referable, not intrinsically to gout, but to the state of constitution in which it occurs; and to the constitutional derangements should the treatment be directed, without bias from the imputed cause. The varieties, when scrutinized, will be found to consist of gouty tendencies combined with visceral affections and with more or less of debility; and in treating them the object should be to restore general health, and thus reduce whatever gout there may be to its simple and intelligible state, rather than aim at improving health by any specifics supposed to act directly on gout. The latter mode has been tried sufficiently long and by sufficient variety of means to prove its utter inefficiency, and deprive it of all confidence. The history of specifics and their effects would

furnish a lamentable display of error and its consequences. The Portland powder appeared to cure, but the result of Dr. Cullen's inquiries was that not one of those who were so cured survived three years. Some died suddenly, while others were attacked with apoplexy, palsy, asthma, hydrothorax, general dropsy, or general cachexia. In this conclusion both Dr. John Gregory and Dr. James Gregory were led by their investigations to concur. The ravages occasioned by the *eau medicinale* are of too recent date to need more than a casual mention.

According as the general health is broken, and the power of bearing active treatment weak, must gouty patients abate in their expectations of cure, and be content to mitigate their sufferings by such means as sound principles sanction; and by adhering to these much may be done even in extreme cases. In all may fever be allayed, plethora prevented, the bowels kept free, the skin perspirable, and contingent derangements receive their appropriate correction.

In proportion as the natural vigour is slight, or reduced by excrementitious plethora, must depletory treatment be cautiously applied to recurring paroxysms; for no promptitude of relief could justify the hazard incurred by even an approach to excessive evacuation. While we contend for the inflammatory nature of gout, and the decided propriety of combating the active disease with proportionally active treatment, we are far from inculcating a rash or indiscriminate use of the lancet, but on the contrary would employ it with great caution, and only under those circumstances in which repeated experience had established both its safety and utility. With a full hard pulse, hot skin, and furred tongue, we would bleed, purge, and give colchicum without hesitation. Even where inflammation was less strongly marked we would employ the same means, provided the evidences of plethora and of febrile excitement were sufficiently discernible; and this treatment has in our own practice had perfect success in abridging the paroxysm, accelerating convalescence, restoring speedily the affected limbs, and greatly prolonging the period of exemption, even in cases of long continuance, where the duration, succession, and severity of paroxysms had induced such helplessness and decrepitude as confined the parties to the couch for two-thirds of the year. The vigour of constitution being the standard by which depletion should be regulated, it follows that when such vigour is deficient, measures of the same activity should not be pursued as are necessary when the habit is robust. In extreme cases, where natural languor and feebleness are confirmed and increased by the effects of excrementitious plethora, when muscular debility is great, the pulse low, soft, faltering, the tongue moist, clean, of a bright red colour, or scarcely whitened, the bowels inveterately foul, the gouty effort feeble and imperfect,—in such cases wine, stimulants, and invigorating regimen must supersede every evacuation save purging. The object in such

cases should be to renovate the frame by improving the bowels and giving tone to the whole system. Should the gouty effort, in consequence of such regimen, become more vigorous, and marked by clear evidences of renovated powers, then may an approach be made to the more effective treatment by which active gout is so signally relieved.

With respect to the nosological varieties, they may be dismissed with very few observations. Cullen has recognized them; namely, the atonic, retrocedent, and misplaced. The atonic is marked by general debility, feeble attempts to generate a paroxysm, and visceral derangements, chiefly gastric. Light food, regulation of bowels, and the several means suited for improving the stomach and giving tone to the general system, should be the means here resorted to. Light tonic medicines may be combined, but they are of little avail, and they should neither be given largely nor too long continued. The condition of the stomach is here analogous to what obtains in gastrodynia, to which head we may refer for the treatment which this derangement requires. What is generally called gout in the stomach is but a high degree of this affection; and when the spasm is intense, with prostration of strength, the strongest stimulants, such as brandy, ether, and laudanum, may be necessary to allay it. Immediately after, however, the stomach should be effectually cleansed of its mucous accumulations by full doses of calomel, antimony, and colocynth; and light cordials with aperients should follow, rather than direct stimulants or tonics. When there is great debility of stomach, chalybeates may be required, and they are best administered in the form of some natural or artificial mineral water. It is in such cases that the internal use of the Bath waters is so eminently serviceable, although they are valuable in most gouty cases, especially where the stomach requires some substitute for the wine and stimulants relinquished. In such cases the grateful stimulus of the Bath waters gives tone to the stomach, improves appetite, and renovates strength, thus accomplishing an unequivocal good; not, as has been falsely imagined, by the mere establishment of gout in the extremities, but by the reduction of gout to its simpler and more manageable state through the amendment effected in the general health. This advantage is great, provided it be rightly understood. If the mere gouty accession be the object desired, and that on its appearance the end is considered as attained, then indeed the benefit is but slight and transitory, while the false experience thence derived serves but to confirm error and perpetuate evil. But if the accession, when thus elicited by means of renovated powers, be regarded as it ought, and properly treated, the opportunity thus afforded for resorting to efficient measures is most valuable, and the Bath waters, so instrumental in procuring it, should receive the credit to which they are so justly entitled. It is curious to observe the fluctuations which take place in public opinion respecting the value of mineral springs. They become fashionable and again decline, not

from any variability in their properties or medicinal effects, but from the misconceptions and caprices to which ignorance is prone. It is lamentable to think how great is the ignorance of the public in all that relates to the structure and functions of their own frames, and how very inconsiderable a portion the science of animal life forms even of that course of instruction which our highest seminaries supply. Formerly Bath was the general resort of gouty patients in all stages and degrees of the disease. The object was not to cure gout, but to excite and hasten it; and as this effect was often produced, their reputation became established. In time it was discovered that in full habits and inflammatory states of constitution their agency was not always limited to bringing on gout, but that other excitements less harmless were apt to ensue. The local practitioners were therefore constantly obliged, in the conscientious discharge of their duties, to withhold the internal use of the waters, however they might allow their external application; and patients who were sent to Bath expressly to drink the waters were naturally disappointed. It came to be doubted, also, whether bringing on the paroxysm was to be considered an unmixed good; and this approximation to just views gave rise to further hesitation respecting the expediency of using the Bath waters. The consequence is that though vast numbers still resort to Bath for gouty complaints, the waters are not held in that high estimation in which they were wont to be regarded. Yet they still retain all the virtues which they ever possessed; are still capable of rendering most valuable services to gouty constitutions, nay, of effecting, in the improvement of stomach and renovation of strength, what no course of medicine, nor any other mineral spring in these countries, could equally accomplish; and there is no reason, save the capricious fluctuations of opinions, why they should not still maintain the high character which they formerly possessed. The objects in administering them may be different, but the effect of this must be to render them only the more serviceable.

Gout has been called retrocedent when the sudden subsidence of the gouty inflammation has been followed by sudden affection of some internal organ or function. Such affection is no doubt liable to occur whenever the local inflammation is repelled without the constitution being adequately relieved. Where it happens, it requires to be treated precisely as if gout were not concerned. If the substituted malady be marked by spasm and sinking powers, cordials and stimulants must be used; if by inflammation, then must bleeding and purging be employed to the full extent which the urgency of symptoms may demand.

The term misplaced gout seems to have been employed without any sufficient reason. It has been applied to any and every incidental disease occurring in a gouty habit. For the most part such disease has been inflammatory; and when it has attacked the stomach, lungs, or brain, practitioners, impelled by the urgent

danger, have not hesitated to bleed freely, however repugnant to such practice their ordinary views of gout might be. It would be difficult to reconcile this practice with the extreme timidity which shrinks from the employment of bloodletting when the inflammation of active gout is situated in the extremities.

(E. Barlow.)

GRAVEL.—See URINE.

GUTTA ROSEA, or ROSACEA.—See ACNE.

HEADACH.—Cephalalgia, from κεφαλή, the head, and ἄλγος, pain. From a very early period the term cephalalgia has been employed to designate various kinds and degrees of pain affecting the head. Some authors, indeed, have confined its use to headachs of the more obtuse and transient character; including pains of a more severe, tensive, and continued kind under the term *cephalaea*. But the words are too nearly alike ever to preserve a separate and distinctive meaning. For all practical purposes it will be more eligible to adopt exclusively the term cephalalgia, as answering to our English word headach, arranging under it the more marked distinctions of headach as species and varieties.

From the intimate connexion which subsists between the sensorium and every other part of the system, it is not surprising that the head should participate in the morbid affections of those parts. Disorders of the stomach, liver, intestines, and uterus, especially, have long been observed to produce pains of the head. Nosologists have accordingly specified many kinds of *sympathetic* cephalalgia; but they have not been equally successful in pointing out the kinds of pain which arise from the diseases of the head itself. In truth, the difficulty of such an undertaking seems to have deterred them from making the attempt. They have too readily acquiesced in the opinion that, with the exception of some organic lesions of the brain, pain of the head almost always arose from morbid affections of other organs. Even the philosophic Cullen has given cephalalgia no place in his nosological system. Yet it would be truly astonishing if the head, itself so susceptible of impression from disorders of other parts of the system, should not suffer pain from some of its own. Many serious structural changes may indeed take place within the head unaccompanied by pain; but it is impossible to deny that numerous other morbid conditions of the brain and its meninges, as well as of the cranium and its coverings, do produce headachs of various and distinctive characters, and requiring a corresponding variety in the treatment.

One of the difficulties connected with the investigation of headach arises from the gradual and almost imperceptible conversion of pain, originally sympathetic, into an independent affection, which may remain long after the primary disease has been removed. Thus dyspeptic headachs not unfrequently induce

permanent disorder in the head, remaining perhaps for months or years as the habitual malady, although the original symptoms of indigestion may have been entirely lost.

Another source of obscurity may be traced to the frequent co-existence of disease in the head and in some other organ with which the head peculiarly sympathizes; each disease serving to influence and aggravate the other. Under such circumstances it is sometimes difficult to determine which was the original malady.

Allied to this difficulty is a third, arising from the simultaneous operation of several of the more powerful exciting causes of headach; such, for example, as immoderate mental excitement and stimulating potations, both upon the head and upon the stomach. Thus, intense application of mind may not only excite headach by its direct action upon the brain, but may at the same time produce evident disorder of the digestive organs. Without careful discrimination, such a headach would probably be ascribed solely to dyspepsia, to the neglect of the actual state of the brain; whereas the derangement of both head and stomach may be alike dependent on the undue excitement of the sensorium.

In no disease, perhaps, does the subject of *predisposition* require to be more attentively considered than in cephalalgia. Of the circumstances which especially predispose to headach we may enumerate the following:—

1. Original malformation of the head.
2. A highly susceptible state of the nervous system.
3. Debility, however induced.
4. General or local plethora.
5. The previous occurrence of congestive or inflammatory disease.
6. Habitual or frequent excess in wine, spirits, and other powerful stimulants.
7. Injuries of the head from blows, falls, &c.
8. Continued mental excitement.

The occasional or *exciting causes* of headach are very numerous. Some of them would produce the disease in almost any individual, even under ordinary circumstances; but the greater number only excite pain of head in persons already predisposed to the malady. Hence the great importance of estimating the degree of predisposition. Of the more frequent occasional causes we may specify:—

1. Rheumatic affection of the pericranium.
2. Inflammation, or a more chronic morbid condition, of the pericranium.
3. Inflammation of the mucous lining of the frontal sinuses, or foreign bodies within the sinuses.
4. Intense mental excitement.
5. Strong impressions on the external senses.
6. Excessive impetus of blood to the head.
7. Impeded return of blood from the head.
8. Congestion within the head.
9. Suppression of accustomed evacuations.
10. Inflammation of the brain or its membranes.
11. Tumours, or other morbid changes of structure within the head.
12. Morbid affections of the stomach:—as from over-excitation or distension; from irritating ingesta; from imperfect digestion; the presence of bile in the stomach, &c.
13. Costiveness.
14. Narcotics.
15. Worms.
16. Diminished pres-

sure of the atmosphere. 17. A heated, humid, or deteriorated atmosphere. 18. Sudden changes of temperature. 19. Exposure to a current of air, or to a cold wind, especially from the east.

This enumeration will sufficiently shew the impossibility of treating separately every variety of headach in a work like the present. Some leading distinctions of cephalalgia can alone be attempted; and such, we apprehend, may be satisfactorily comprised in the following species:—

1. Cephalalgia muscularis.
2. ————— periosteosa.
3. ————— congestiva.
4. ————— organica.
5. ————— dyspeptica.
6. ————— periodica.

Of these we shall now proceed to treat separately.

I. *Cephalalgia muscularis*.—This kind of pain is essentially of a rheumatic character, and particularly affects the occipito-frontalis and temporal muscles. The pain is tensive and remitting, sometimes diffused over the greater part of the head; at other times, varying its situation from the forehead to the vertex or the occiput, or from one side of the head to the other. In some cases, also, the pain extends to the face and teeth. Not unfrequently, the muscles of the neck and shoulders are at the same time affected with fugitive pains. The action of the affected muscles remarkably increases the pain and tension, as does also even slight pressure upon the scalp. The attack may be usually traced to some partial exposure to cold or humidity, as by sitting near an open window, or standing in a current of air after being heated by exercise. It is often preceded by a sense of coldness over the head and along the sides of the face. Some disturbance of stomach usually attends it for the first day or two, accompanied sometimes with slight febrile excitement of the system. These symptoms generally soon subside, even without medical treatment; leaving, however, an increased susceptibility in the parts to a renewal of the complaint from very slight causes. A dose of calomel and antimony, aided by a pediluvium, at night, and followed by a brisk aperient dose in the morning, considerably expedites the departure of the pain. In some cases of peculiar severity, diaphoretic remedies are required; and if the pain be very acute, leeches to the temples will afford considerable mitigation. But the principal aim of the practitioner should be to prevent a recurrence of the attack, by directing the patient to be much in the open air; to use a shower-bath daily, or, in its stead, the free affusion of cold water over the head; and every other practicable method of restoring the tone of the affected parts, and thus enabling them to resist the influence of cold and humidity.

II. *Cephalalgia periosteosa*.—This is an unusual form of headach, and has not, we believe, been hitherto described by authors. The writer of this article first pointed out its nature in a paper read before the Westminster Medical

Society in the year 1825. In many particulars, the periosteal headach resembles the muscular. As in that species of cephalalgia, the pain is diffused, tensive, and remitting, increased by pressure and by the action of the occipito-frontalis and temporal muscles. It may also be generally traced to the same exciting causes, humidity and sudden changes of temperature. The very parts affected in the merely muscular headach are equally involved in this; but, in addition, the periosteum is also affected, and the sensorium suffers more excitement. The pain itself is more deeply-seated and intense, and is attended with an augmented action of the external arteries of the head, as well as with more gastric and general febrile disturbance. The attack, moreover, does not so speedily subside; for although after a few days the muscular covering of the head can be moved without pain, and slight pressure no longer produces uneasiness, yet the periosteal pain and tenderness remain. Firm and deep pressure is still painful, and excites a sensation of distressing tension over the greater part of the head and face. The same kind of constrictive pain is produced almost invariably by going out of a warm into a cold room, or by taking off the usual covering of the head. The whole periosteum, indeed, of both the head proper and the face is implicated in the disease, although those parts of the membrane suffer most which are but slightly covered. Hence, the upper portion of the nose and the alveolar processes are particularly affected. We may here remark, as a striking proof of the periosteum itself being the immediate seat of the malady, that the pain is frequently transferred for a time from the head to the face, soon, however, returning to its more accustomed seat around the head. It is not less remarkable that an increased feeling of tension may be induced over the whole or the greater part of the head and face by firm pressure upon any one point of the periosteum, whether of the head or of the face. Hence we may conclude that the structure affected is one common to both head and face.

It may, perhaps, be supposed that the periosteal cephalalgia now described is only an aggravated form of rheumatic headach. It is, however, a far more complicated and intractable malady, and occurs, we believe, only to those who have previously suffered from continued cerebral excitement. In truth, a two-fold predisposition appears to be essential to its production:—first, a highly susceptible, if not also preternaturally vascular, condition of the brain or its membranes, such as is often induced by long-continued study or high mental excitement, as well as by the frequent occurrence of sympathetic headach arising from gastric or hepatic disorder: and secondly, a state of debility and exhaustion supervening upon that excited condition of head, whether occurring spontaneously, or as the result of the depletory measures employed for the removal of the previous cerebral excitement. If an individual, under these concurring circumstances, be exposed to a powerful exciting

cause, such as a sudden diminution of temperature, especially if accompanied by humidity, he may have the periosteal cephalalgia induced, —a disease of a singularly obstinate character, and apparently maintained by that condition of the brain or its membranes, which existed prior to the supervision of the external malady. On the other hand, the pain and irritation connected with the external malady tends, in its turn, to perpetuate the morbidly excitable state of the brain. The following case may serve as an illustration.

A gentleman of a susceptible constitution, who had long been subject to occasional attacks of dyspeptic headach, and had frequently suffered from mental application during a long and laborious course of study, was thrown at once into the onerous duties of a large public institution. Much pain and excitement of head ensued. General and local bleeding, mercurial purgatives, antimony, low diet, &c. were considered necessary. The symptoms subsided considerably, but the brain and nervous system remained in a state of extreme susceptibility. On some recurrence of pain, it was judged needful to shave the head, which happened to be done under circumstances of great exhaustion on a cold wet evening. The ordinary covering of a thin night-cap was alone worn during the night. On awaking from sleep, a severe constrictive pain was felt over the whole head, attended with heat and tenderness of the scalp, throbbing of the temporal arteries, considerable cerebral excitement, and vomiting. In truth, an external periosteal disease was thus engrafted upon a head previously suffering from high and continued excitement. After a few days, the more superficial tenderness subsided, but the periosteal affection proved exceedingly intractable. In this case it seems probable that the frequent occurrence of sympathetic headach, aided by the excitement attendant on long-continued study, had induced an undue degree of vascularity and of nervous susceptibility in the head generally; while the remarkable prostration of vital power consequent upon the depletory measures employed, served to increase the nervous susceptibility, and thus concurred to form that two-fold predisposition of which we have before spoken, and without which, we apprehend, the subsequent exposure to cold and humidity would have been insufficient to excite this peculiar periosteal cephalalgia, although it might have produced an ordinary rheumatic affection of the scalp. So exquisitely sensitive does the pericranium remain in these cases, so readily affected by every exposure to humidity or sudden reduction of temperature, and so apt to participate in every occasional excitement of the brain, that one attack of the complaint has scarcely time to subside before some fresh exposure gives rise to a decided augmentation of disease.

In the treatment of periosteal headach the first object must be to lessen the general cerebral excitement, as well as the inflammatory tendency and morbid sensitiveness of the affected membrane. Local bleeding, mercurial

purgatives, antimonials, the acetate or citrate of ammonia, and similar means, are best adapted to fulfil these indications. Opiates are of doubtful efficacy. Should much nausea occur at the commencement of the attack, an emetic would be advisable; after which a dose of calomel and antimony, followed by a saline purgative, will generally be found very advantageous. The utmost quietude of mind should be preserved.

After the acute symptoms have been subdued, vigilant attention will be necessary to guard against a relapse. The susceptibility of the pericranium may be moderated by the gradual use of cold washing, followed by gentle friction of the head, as well as by a free though prudent exposure to the open air in the way of carriage, horse, and walking exercise. A residence in a dry and somewhat elevated situation will materially conduce to the patient's recovery. But it must also be remembered that the morbid condition of the membrane may be maintained by undue cerebral excitement, and that therefore the discipline of the mind, the avoidance of intense or long-continued study, and every engagement and pursuit which may tend to perpetuate that excitement, are absolutely essential to a permanent cure.

Under the division of periosteal headach it may be proper to describe that affection of the pericranium which has been called by Mr. Crampton *periostitis*.* Cases in some respects similar had been previously published by Sir Everard Home,† and some important illustrations of the same subject have been recently added by that accurate and distinguished pathologist, Dr. Abercrombie.‡ Fixed pain of head and tenderness of some portion of the scalp, with a degree of thickening and swelling of the integuments, were the characteristic symptoms. The periosteum was generally found thickened, and, in some cases, the bone itself diseased. In the majority of instances, some affection of the brain co-existed with the periosteal disease. It would seem probable, however, that the periosteum was primarily affected in several of the cases adduced; in those, particularly, in which complete and permanent relief followed the division of the pericranium and the keeping open of the wound for a considerable time. Yet it must be allowed that even pains of head, apparently connected with internal as well as external disease, have been essentially relieved by such an operation. Mr. Brodie and the late Mr. Pearson have repeatedly cut down to the bone in cases of fixed and obstinate pain confined to a limited part of the head, maintaining afterwards a free discharge from the part, and with very decided success.

We might here without impropriety have introduced another kind of headach—that depending on a diseased state of the bones of the cranium, and attended with constant pain and tenderness at some particular spot; but as such cases

* Dublin Hospital Reports, vol. i.

† Trans. of the Soc. for the Improvement of Med. and Chir. Knowledge, vol. iii.

‡ On Diseases of the Brain and Spinal Chord.

are comparatively rare; we are unwilling to present it as a distinct species.

III. *Cephalalgia congestiva*.—This species is characterized by an obtuse pain affecting the whole or a part of the head, particularly the forehead and occiput, and is frequently attended with a feeling of general oppression and torpor. It may be observed in three different states of constitution:—in the plethoric; in the delicate and irritable; and in the weak and leucophlegmatic.

1. The congestive headach frequently attacks persons of a *plethoric* habit, who have passed the middle period of life, have lived freely, and have used but little bodily exercise. In such the countenance is often bloated, the eyes are full and red, the veins of the face distended, and the general expression dull and inanimate. It is more especially observed in those who have suffered from gout or from chronic diseases of the liver, and after the cessation of the catamenia. In such it must always be regarded with vigilant attention, as indicative of an apoplectic or paralytic tendency.

2. The congestive cephalalgia also affects the *delicate and irritable*, especially those whose minds have been injudiciously cultivated at the expense of their bodily health and vigour. Hence it is most frequently observed in the female sex. In persons of this temperament the sanguineous circulation is so nicely balanced as to be disturbed on very slight occasions. A vivid emotion of mind, earnest or continued conversation, an unusual degree of bodily exercise, or some irregularity in diet or in the action of the bowels, will occasion in such habits an increased impetus of blood to the head, which, though only producing at the time a sense of heat and excitement, is generally followed by coldness of the legs and feet, and by the dull oppressive headach of which we are now treating. In some cases, the pain is attended with flashes of light or with little floating specks before the eyes, as well as by noises in the ears. This species of headach is particularly observable in delicate females of an irritable temperament, both before and for a day or two after each menstrual period.

3. The congestive headach also attacks the *weak and leucophlegmatic*. It may be recognized in persons who have been reduced by acute diseases, by hemorrhages, leucorrhœa, &c. It is also seen in chlorosis and in various other asthenic conditions of the system. There is usually a slow and languid pulse, a pale, sallow, or even semi-transparent appearance of the skin, and a peculiarly heavy expression of countenance. The lips are generally pale, or of a slightly blue tint; the feet are apt to swell in hot weather or after exercise; and every muscular exertion becomes laborious and formidable. In this variety of congestive headach, the pain is most commonly in the forehead, although in some cases the occiput is chiefly affected.

The *treatment* of congestive cephalalgia must necessarily be adapted to the circumstances of each individual case. We may remark that,

in the first variety, that which is incident to the plethoric habit, venesection or cupping, brisk purgatives, a moderate diet, the affusion of cold water upon the head, and stimulating pediluvia, are usually required. When the attack has been subdued, the patient should be directed to avoid much mental application; to observe regular habits of exercise in the open air, as well as great moderation in diet, and a careful attention to the state of the bowels. The shower-bath should also be daily employed.

In the congestive headach of the weak and irritable, it may be sometimes necessary to have recourse to topical bleeding; but, generally, quietude of mind, a stomachic aperient, the application of cold to the head, either by the affusion of water or by evaporating lotions, stimulating pediluvia, and the exhibition of camphor and ammonia or other diffusible stimulants, will prove adequate to the removal of the attack. Every precaution should be used to prevent a recurrence of the complaint by increasing the tone of the system, and thus counteracting the undue susceptibility of impression and the irregular distribution of blood, with which the malady is peculiarly connected.

The third variety of congestive headach, that occurring in the weak and leucophlegmatic, requires nearly the same management as the last. In this, however, the loss of blood can scarcely ever be necessary, although blisters are sometimes indicated. Warm and cordial aperients, the moderate use of wine, camphor, valerian, or ammonia, aided by a mustard or other stimulating bath for the feet, are well adapted to remove the immediate pain; while good air, gentle exercise, a nutritive diet, cheerful society, with the assistance of tonic remedies, more particularly the lighter preparations of steel, are not less calculated to invigorate the constitution, and thus preserve it from future attacks of the complaint.

We now proceed to a very important division of our subject, viz. headach arising from organic disease within the cranium: this we have ventured to name, although the term is not unexceptionable,

IV. *Cephalalgia organica*.—So numerous and complicated are those morbid changes of the brain and its membranes which have been found to produce headach, that we must content ourselves with a reference to the most frequent of them; endeavouring chiefly to point out the principal symptoms which distinguish the organic headach from cephalalgia arising from other causes. Among the structural changes productive of headach, tumours are undoubtedly the most frequent. These may be either imbedded in the substance of the brain, or attached to its surface, or to the membranes surrounding it. Such tumours may be of a pulpy, adipose, albuminous, cartilaginous, scirrhous, or even bony consistence. Hydatids are another cause of headach, as are also spiculæ of bone attached to the dura mater, or growing from the inner table of the skull. In a case which occurred to the writer a few weeks ago, one of the clinoid processes

of the sphenoid bone was found unusually long and formed into a thorny point, so sharp and strong as to pierce the finger when pressed against it. A similar, though not equally long point, was found to have grown from the squamous portion of the temporal bone. In some instances the membranes of the brain have been found thickened and partially disorganized; in others a portion of the brain has exhibited a softening or degeneration of its structure, or one or more abscesses imbedded within its substance.

In many of these diseased conditions, the pain of head may remain, during a considerable period, unattended by any other prominent symptoms: at length, however, some decisive indication of inflammatory action or of cerebral pressure occurs; the sight or hearing, for example, becomes affected, or the powers of the mind become enfeebled, or simple convulsion, epilepsy, or paralysis announces the extension of disease.

The diagnosis of cephalalgia organica is often difficult at an early period, while the pain is unattended by any morbid affection of the senses or of the moving powers. In general, however, we may remark that the pain itself is more fixed, deep-seated, and habitual than in other kinds of headach; more independent of the state of the stomach; more obviously increased by mental application, by close or heated rooms, by stooping, and sometimes even by the horizontal posture. The same degree of cheerful conversation which would chase away, or at least suspend the feeling of, ordinary headach, often becomes laborious and almost insupportable in organic cephalalgia. Nor is the effect of stimulants received into the stomach less remarkable. Wine and other fermented liquors produce an immediate aggravation of pain. When the disease has considerably advanced, even a slight motion of the head will sometimes give rise to extreme suffering, and also to vomiting. It is proper to add that the disturbance of stomach which is sometimes present in this species of headach may occur without any apparent disorder of the stomach itself, and in this respect, as well as in others, differs materially from the sickness incident to dyspeptic headach. Moreover, the pain in organic cephalalgia equally remains when the sickness ceases. We have said that the pain in organic headach is fixed and habitual. There are, however, exceptions to this general rule. Sometimes the pain is of an intermitting character, although serious structural mischief may be steadily advancing. In such cases, the most vigilant attention to the collateral symptoms will be required before the real nature of the case can with any reasonable probability be determined.

V. Cephalalgia dyspeptica.—This may be regarded as the most frequent kind of headach. In many individuals it is induced by very slight errors in diet, or even by remaining somewhat longer than usual without food. It may occur without any remarkable or at least very obvious degree of susceptibility in the

brain. We see it, for example, in persons who can bear close application to study without any apparent inconvenience to the head itself, while yet very liable to headach from taking certain articles of food, or mingling them in too great a variety. Yet, in the majority of instances, it must be allowed that dyspeptic headach is most frequently found in those persons who also suffer from much mental excitement, and in whom the gastric disturbance is only one effect of that excitement. In such, the stomach may become either morbidly irritable or in the opposite state of atony, being, in either case, equally unfit for the due performance of the digestive functions, and therefore liable to be still further deranged by any irregularities in diet. The dyspeptic or stomach headach, when severe, more particularly affects the left temple, extending sometimes over the same side of the forehead, and producing tenderness in the corresponding ball of the eye. In other instances, the whole forehead, or even the greater part of the head, becomes painful. The pain may be either dull and oppressive, or of a more acute character, and in both cases renders mental exertion difficult and irksome. It is not unfrequently attended with some tenderness of the scalp, and an increased pulsation of the temporal arteries. The paroxysm of dyspeptic cephalalgia usually commences when the patient first awakes in the morning from a heavy sleep. The pain, at first diffused and oppressive, gradually concentrates itself upon one or other temple, generally the left, and becomes more and more acute. A degree of nausea often supervenes, sometimes increasing to sickness and vomiting. If the latter occur, the remains of an undigested meal, or merely an insipid fluid mixed with frothy mucus, is perhaps first ejected; but if the action of vomiting continue long, some admixture of bile usually follows. In some instances the stomach throws off, on the first attempt, green or yellow bile, or a fluid extremely acid and irritating; in which case, the pain of head is sometimes immediately relieved.

If neither vomiting nor aperient medicine be employed to check the ordinary progress of the paroxysm, the pain generally becomes more severe as the day advances, until it is lost in sleep. Occasionally, it remains during the greater part of the second day. When, however, an active dose of purgative medicine has been taken, the headach often becomes less in two or three hours, and ceases altogether in six or eight. It is remarkable that the beneficial effect of a stomachic and antacid purgative is frequently felt long before the offending matters are expelled from the bowels, clearly indicating that the sources of irritation were either in the stomach itself, or in the upper portion of the intestines.

Such is the usual course of a sick headach when occurring as a distinct paroxysm. The dyspeptic cephalalgia may, however, exist in a more chronic and habitual form, and in every possible degree. It may also be very transient in its duration. Many individuals suffer more

or less inconvenience after every principal meal, unless they limit themselves, with the utmost prudence, in respect to the kind and quantity of food; but after two or three hours, the pain of head spontaneously ceases. When the stomach itself suffers from irritating ingesta, drowsiness or headach rather quickly succeeds, attended sometimes with confusion of thought and dimness of sight. In such cases, a mild emetic affords immediate relief. In many instances, however, the pain is not felt until several hours have elapsed, and is then accompanied with a sense of tightness and distention of the scalp and stiffness of the eye-balls. Sometimes the patient sees a mist before his eyes, or even luminous and coloured appearances before the headach comes on. Under these circumstances, there is reason to believe that the *duodenum* is principally irritated; an opinion which is rendered probable by the sense of distention and uneasiness which is often felt in the exact situation of that bowel. It is sometimes, indeed, fully confirmed by the fact that an emetic under such circumstances does not afford relief, nor even evacuate any thing material from the stomach; while, on the contrary, a dose of magnesia, either alone or combined with rhubarb or epsom salt, will in two or three hours relieve both the headach, and the uneasiness existing along the course of the *duodenum*. Yet it is proper to add, that when the irritating cause is considerable, both the stomach and *duodenum* remain in a state of disturbance during several hours.

In a very able paper on headach, inserted in the fourth volume of the Medical Transactions of the Royal College of Physicians, Dr. Warren maintains that the headach arising from irritation of stomach differs considerably from that which is produced by disturbance in the *duodenum*; that the former "is attended more with confusion than pain," while the latter is characterized by a dull aching of some parts of the head, "coldness and tightness of the scalp, slight giddiness, weight, pain, distention and stiffness of the eye-balls," and sometimes temporary numbness and tingling of the fingers and hand. Although feeling the greatest confidence in Dr. Warren's accuracy of observation, we have not been able satisfactorily to determine that the latter symptoms may not also occur from irritation of the stomach itself as well as of the *duodenum*; nor are we convinced that the *duodenum* can be irritated to such an extent, by matters which have lately been propelled from the stomach, as to produce a high degree of cephalic irritation, without its contiguous organ, the stomach, being at the same time somewhat implicated in the disturbance.

The exciting or immediate causes of dyspeptic cephalalgia are sufficiently obvious: long fasting; excess in wine or other powerful stimulants; or in the quantity, quality, or variety of solid food, are among the principal. Particular articles of food, likewise, which are innoxious to most persons, become irritating to certain individuals. But it must not be

forgotten that the efficiency of the exciting cause bears an important relation to the amount of predisposition; an article of food, for example, may produce headach to-day, if the stomach or the brain, or both, be unusually excitable, which would not have produced it yesterday when those organs were less susceptible of irritation. Hence the importance of particular investigation with respect to the previous state of the head, as well as of the digestive organs. In many instances it will be found that sedentary habits, excessive mental application, anxiety, the hurry of business, and similar causes, have gradually induced a strong predisposition to headach, although the tendency may not have been developed until some error in diet, acting as the exciting cause, gave rise to gastric disturbance, and thence to sympathetic pain in the head. In truth, a two-fold predisposition may be often said to exist, involving both the head and the stomach. In some cases mental excitement would seem to precede the morbid affection of the stomach. In persons of great susceptibility, a very high degree of cerebral excitation appears to be inconsistent with an adequate supply of nervous energy to the digestive organs; as if there were but a certain portion of vigour to be shared by the different parts of the system, and, consequently, that an undue proportion allotted to one occasioned a corresponding deficiency in the rest. The fact, however, is incontrovertible, that, in many susceptible individuals, intense engagement of mind induces a powerless state of stomach and *duodenum*, giving rise to dyspepsia, and the headach arising from it.

Not uncommonly cerebral excitement occasions a rapid and profuse secretion of bile, which, in its turn, produces a sick or bilious headach in its severest form. We have repeatedly seen the same effect follow an unusual degree of bodily exercise; in which case, it is sometimes attended with both vomiting and purging of a highly bilious character.

The dyspeptic cephalalgia chiefly occurs in early or in middle life, becoming less and less severe as the irritability of the system gradually declines. Sometimes, however, as life advances, there is an apparent transfer of irritability from the stomach to the bowels. Frequent diarrhœa takes the place of bilious headach, being excited by the same circumstances.

The treatment of dyspeptic headach requires a careful adaptation to the peculiarities of each case. An ordinary paroxysm of the pain, if attended with much nausea, may be considerably shortened by an ipecacuanha emetic, afterwards allowing to the stomach and to the head an interval of entire repose. After an hour or two, twenty or thirty grains of magnesia combined with rhubarb, or the sulphate of magnesia and an aromatic, may be given, and followed, after some hours, by a little bland farinaceous nourishment. Where no particular nausea is felt, the antacid aperient may be given at the first. A few grains of the subcarbonate of ammonia, or thirty or

forty minims of the aromatic spirit of ammonia, may be added with advantage, when the stomach is peculiarly irritable.

In the milder and more chronic forms of dyspeptic headach, much will depend on the discipline of the mind and the regulation of the table. Every individual may be able, by proper attention, to ascertain what kinds of food and what quantity of food he can comfortably digest; and under what particular circumstances the symptoms of indigestion and headach have generally arisen.

A little observation will also discover the connexion which subsists between that state of tone and vigour of the whole system which regular bodily exercise induces, and the power of the stomach itself. Thus it will be found that the same kinds and quantity of food which perfectly agree while the individual takes his daily walk in the open air, and employs his brain within moderate bounds, become sources of indigestion and headach when the head is allowed too much duty and the feet too little.

The daily management of the bowels is an object of great importance in this kind of headach. When diet and exercise prove insufficient to secure a daily motion, a mild stomachic aperient, combined, perhaps, with an alkali, may be given every night, or on alternate nights, until the tendency to constipation and headach be overcome. When, however, there appears to be much *duodenal* indigestion, a few grains of rhubarb, or of a grain or two of aloes, taken before dinner, will be a preferable mode of increasing the propulsive power of the intestines. We cannot, however, recommend this as a general mode of regulating the bowels; being convinced that it often accelerates, in an injurious degree, the peristaltic action, and deprives the system of a part of the nourishment which would otherwise be received by absorption. Persons have been found to become manifestly thinner under such a plan. When, as indeed often happens, the biliary secretion is irregular or defective, a mild mercurial preparation may be given for a few successive or alternate nights. Occasionally some aromatic bitter, either with or without soda or ammonia, may be employed with advantage. Horse-exercise, if it be not used to the exclusion of walking, is often extremely beneficial. The shower-bath, or cold sponging, aided by friction of the skin and moderately warm clothing, are also powerful auxiliaries.

VI. Cephalalgia periodica.—This kind of headach is said to be sometimes hereditary. It may have regular or irregular accessions, and may occur in a quotidian, tertian, or quartan form. It has returned periodically at the regular intervals of several weeks or even months. Most commonly it observes daily accessions, returning either in the morning or at noon. Sometimes a very limited portion of the head, a small spot, is alone affected. Not unfrequently the pain commences at the inner angle of the orbit, producing pain, redness, and tenderness of the eye, and extending towards the nose. This has been popularly

called *megrim*. In other instances, one entire half of the head and face is affected, constituting the *hemicrania* of authors. The pain is sometimes so acute as to resemble that of tic douloureux; but it may generally be distinguished from the latter by its more regular periodical accessions, by the longer duration of each paroxysm, and by the more complete and protracted intermissions. In many cases, too, the periodic cephalalgia is obviously connected with existing rheumatism or catarrh. The pain of tic douloureux, on the other hand, is generally very sudden in its attack, and quite excruciating in its degree, but lasts only for a few seconds. It returns at indefinite periods, being readily excited by the slightest exposure to a current of air, or by the motion of the jaws in eating or speaking. The cephalalgia periodica also bears some resemblance to the muscular or simply rheumatic headach; from which, however, it may generally be distinguished by the greater regularity of its accessions; by its usually affecting a circumscribed portion, or, at most, one side of the head and face; and more particularly, by its frequent connexion with intermittent fever. Sometimes, indeed, it appears to be the direct effect of an exposure to malaria, although unattended with the ordinary phenomena of fever. In other instances, a carious tooth or some lesion of the antrum highmorianum has appeared to produce and maintain the disease. Accordingly, the extraction of the afflicted tooth has entirely removed the cephalalgia.

As in every other species of headach, a careful consideration of the peculiarities of each individual case can alone lead to a discriminating and successful treatment. Where no local irritation can be traced, and no congestive symptoms about the head appear, cinchona in substance, or the sulphate of quinine, may be exhibited in the intervals, as soon as the bowels have been thoroughly cleansed by a dose of calomel conjoined with rhubarb, jalap, or some other effective purgative. In some peculiarly obstinate cases, it may be right to have recourse to the arsenical solution, preserving, at the same time, a regular state of bowels by some mild aperient, in combination with the pilula hydrargyri or the compound pill of the submuriate of mercury. Where the paroxysms are extremely violent, much relief may be often gained by a full opiate conjoined with the compound spirit of sulphuric ether, given just before the expected accession. In the more limited forms of the periodical cephalalgia, the extracts of belladonna and opium, applied to the part affected, sometimes afford considerable mitigation.

(T. H. Burder.)

HEART, DISEASES OF THE.—Diseases of the heart were, until recently, supposed severally to present symptoms of very much the same general character, and therefore to constitute a class of maladies which possessed considerable unity in their intrinsic nature. They are now, however, found to consist of a variety of distinct affections producing very

different and sometimes opposite symptoms. Thus, hypertrophy produces increased, and dilatation diminished force of the circulation. In order, therefore, to appreciate the value, and familiarize ourselves with the nature, of each class of symptoms, it is necessary to study the several affections in an isolated form. We are thus enabled, on meeting with a *compound* case—one consisting of a complication of several of the simple affections—to analyse or unravel the symptoms, ascertain the relative importance of each class, and in this manner establish rational and secure principles of treatment. In conformity with this view, the various articles on the diseases of the heart, instead of being assembled under the present head, are, for facility of reference, diffused alphabetically throughout the work. We have here only to put the whole together in a systematic form, so as, by pointing out the affinities from detached articles, to enable the student to prosecute his studies in a consecutive form, and to find with facility any given article or topic to which he may wish incidentally to refer.

Physiology of the heart's action, and physical signs—healthy and morbid. In the article *AUSCULTATION* will be found a sketch of the physiology of the heart's action according to the principles of the writer, adopted throughout this work, and a general exposition of the principles of auscultation in reference to the heart. A more particular and differential account of the signs afforded by auscultation and percussion will be found in the several articles to which the signs respectively refer: viz.—in the article *HYPERTROPHY OF THE HEART* are all the signs characterizing this affection, whether simple or combined with dilatation. In *DILATATION* are the signs of the simple and the attenuated forms of the disease; the other forms, with their signs, being comprised under *HYPERTROPHY WITH DILATATION*. In *DILATATION* the *range of sound*, and in *HYPERTROPHY* that of *impulse*, is more particularly described. Under *VALVES, DISEASES OF THE*, are the signs of all the varieties of this affection, with the diagnosis from analogous signs produced by nervous derangements; under *AORTA, ANEURISM OF THE*, are the signs of disease of the great vessels, with the diagnosis from nervous affections; and under *MALFORMATIONS* and *POLYPUS* are the peculiar signs, according to the writer's observation, of those maladies.

We would recommend the student to adopt the following arrangement of the articles in studying the various diseases of the heart consecutively. Inflammatory affections of the heart and great vessels, as they give birth to a large proportion of the organic diseases, should take precedence of the rest. Thus *PERICARDITIS* leads to *ADHESION OF THE PERICARDIUM*, (which subject is discussed at the end of *PERICARDITIS*); and the latter leads to *HYPERTROPHY WITH DILATATION*. *CARDITIS* (which is treated of under *PERICARDITIS*) gives rise to *SOFTENING, INDURATION, DILATATION*. *ARTERITIS*, acute and chronic, contains an account of the morbid alterations of the valves and internal membrane of the heart and arteries, to

which it gives origin. Under this head, also, the other probable causes of some of these alterations are fully discussed. *HYPERTROPHY* should next be studied. It embraces the varieties in which it is conjoined with dilatation. After reading this article the student should proceed to *DILATATION*, in order that, by contrasting the respective varieties, the mode of production, and the pathological effects of hypertrophy and of dilatation, he may be enabled to form a just and comprehensive idea of the relative nature of the two affections. *DILATATION* presents an account of those varieties only in which the force of the heart's action is *not* increased: viz.—*DILATATION WITH ATTENUATION*, and some cases of *SIMPLE DILATATION*; those in which the action is increased being described under *HYPERTROPHY WITH DILATATION*. After reading *HYPERTROPHY* and *DILATATION*, the student should proceed to *VALVES, DISEASES OF THE*, as he is now prepared to understand how these produce their effects, and become causes of hypertrophy and of dilatation. *VALVES, DISEASES OF THE*, comprehends every variety of these affections, with the signs physical and general; and also an account of cardiac asthma. The following diseases of the muscular structure may next be studied: *PARTIAL DILATATION, OR REAL ANEURISM OF THE HEART; SOFTENING; RUPTURE; INDURATION; FATTY AND GREASY DEGENERATIONS; PRODUCTIONS, ACCIDENTAL; ATROPHY OF THE HEART. AORTA, ANEURISM OF THE*, comprising an account of nervous pulsation of the aorta, forms an elaborate article, much original matter being added with a view to establish the diagnosis—one of great importance, and now, we trust, presenting little obscurity: the study of this subject should be deferred till the reader is acquainted with *HYPERTROPHY, DILATATION, and VALVES, DISEASES OF THE*, as he will thus be better qualified to understand how disease of the aorta gives birth to that of the heart, and constitutes one of the most formidable complications of cardiac affections. *MALFORMATIONS, ANGINA PECTORIS, POLYPUS OF THE HEART, DISPLACEMENTS, HYDRO-PERICARDIUM, PNEUMO-PERICARDIUM, PALPITATION*, particularly nervous and dyspeptic, are severally brought under consideration in separate articles.

Treatment.—In the article *PERICARDITIS*, the treatment of the inflammatory affections is fully considered. A few remarks are also appended to *ARTERITIS*. In *HYPERTROPHY* and *DILATATION* respectively, the observations on treatment are confined to the immediate and peculiar effects of each disease; while *VALVES, DISEASES OF THE*, is a general article on treatment, not only embracing all the secondary effects, but giving a detailed account of the manner of exhibiting, and the *modus operandi* of the various remedies employed. In *AORTA, ANEURISM OF THE*, the mode of spontaneous cure and the medical treatment are fully explained, and remarks are added on the treatment of nervous aortic pulsation.

We shall conclude this brief explanatory and indicatory notice with a few remarks on

the diagnosis and treatment of cardiac affections in general.

Diseases of the heart were formerly involved in deep obscurity. This is no longer the case. By a *conjunction* (and the necessity for this conjunction cannot be too strongly impressed) of the *physical* signs, or those afforded by auscultation and percussion, with the *general* signs, improved as they have been in consequence of being studied with the aid of auscultation, the diseases in question may be detected with a facility and precision which can scarcely be surpassed in any other class of affections. The *direct* practical advantage resulting from this is, that instead of being almost incurable, as they were formerly regarded in consequence of seldom being detected till they had attained an incurable degree, they now, from admitting of detection even in the earliest stage, can in numerous instances be completely cured; and when not, can in general be so far counteracted as not materially, and often not at all, to curtail the life of the patient. The *collateral* practical advantages are no less important. Apoplexy and palsy, in a scarcely credible number of cases, are directly dependent on hypertrophic enlargement of the heart. Should the cause be detected, the effect may be obviated; should it be overlooked, the patient would probably fall a martyr to the "active exercise" supposed necessary to reduce his *apoplectic fulness of habit*. No less frequently are the most dangerous cases of asthma, of dropsy, and of epilepsy, referable to disease of the heart; and this malady seldom occasions long-continued obstruction of the circulation without producing enlargement of the liver,—one of the least generally known of the common facts in medical science. Nervousness and dyspepsia very often assume the aspect of disease of the heart; and this, on the other hand, being frequently productive of nervousness and dyspepsia, may be disguised by, and mistaken for them, though with the aid of auscultation the diagnosis presents no difficulty. In acute rheumatism the most formidable source of danger is inflammation of the pericardium. Inflammation of the lungs supervening on organic disease of the heart is singularly rapid, uncontrollable, and destructive. In fever and inflammation in general, the state of the pulse as to fulness, hardness, weakness, or irregularity, may be completely disguised by a co-existent disease of the heart. In all the above instances the appropriate treatment would differ widely and perhaps entirely from that which the practitioner would probably adopt were he to remain ignorant of the affection of the heart.

This brief sketch is sufficient to display the extensive relations and vast importance of the subject of cardiac affections, and to show, that unless the practitioner be conversant with it, not only may he compromise the safety of his patient, but his reputation must be responsible for many mortifying falsifications of his diagnosis, and for the blind impression that danger was remote when it was at the threshold.

(J. Hope.).

HEART, DISPLACEMENT OF.—*Ectopia cordis*, from *ἐκτοπίζω* or *ἐκτόπιος*, displaced. The human heart, when occupying its natural position, is situated in the left side of the thorax, behind the sternum and cartilages of the true ribs, and between the right and left lungs. In this situation it is placed obliquely, so that if a line were passed through its axis at the moment of its pulsation, its direction would be downwards, forwards, and to the left side. Its base is placed almost directly opposite the eighth dorsal vertebra, from which it is separated by the œsophagus and aorta, while its apex is turned forwards and obliquely over to the left side; so that it corresponds, when in a state of repose, to the cartilage of the sixth true rib, and strikes during its pulsation between the cartilages of the fifth and sixth left ribs, at a point about two inches below the nipple, and one inch on its sternal side. The inferior or posterior surface of the heart is flat, and rests upon the tendon of the diaphragm, which supports it; its superior or anterior surface is convex, and is overlapped by the anterior edges of the lungs. From this, which may be considered the natural position of the heart, numerous forms of deviation have been observed, from a slight alteration in the direction of its apex, to the total displacement of the organ from the interior of the chest.

Displacement of the heart may occur as a *congenital malformation*, or as the *result of accident or of disease*.

I. Some of the congenital displacements are very similar to those into which the heart is sometimes forced by diseases of the pleura or lungs, or even by certain organic affections of the heart itself; others, again, are liable to be mistaken for aneurismal tumours or other organic diseases of the heart or large vessels, and might, therefore, mislead the physician into the most serious errors of diagnosis, and consequently of practice, if the possibility of their occurring as a congenital malformation were not borne in mind. For this reason we shall give a succinct account of the principal congenital displacements of the heart, referring the reader who wishes for more ample details on this interesting subject to the excellent "*Mémoire sur l'ectopie du Cœur*," published by M. Breschet in the second volume of the "*Repertoire Général d'Anatomie*," and to Dr. Paget's "Inaugural Dissertation on the Congenital Malformations of the Heart."*

The congenital displacements of the heart may be divided into two classes: the first comprising those cases where the heart is contained within the chest, but does not occupy its natural situation there; the second containing those cases of malformation where the heart is situated out of the cavity of the thorax.

Cases of this description, though of not very unfrequent occurrence, from the slight inconvenience they occasion, have received comparatively little attention; yet from the

* Edinburgh, 1831.

resemblance they bear to the displacements produced by disease, they are, perhaps, the most interesting and important to the practical physician. The following are the principal deviations from its natural position dependent on congenital malformation, which the heart presents while still situated within the thorax.

Instead of being placed diagonally to the axis of the body, with its apex pointing to the left side, it may be situated, *a.* horizontally; *b.* vertically, with its apex pointing downwards; *c.* vertically, with its apex pointing upwards; *d.* diagonally, with its apex pointing to the right instead of the left side; or *e.* transposed altogether to the right side of the chest.

a. The heart has, we are informed, been found in the horizontal position;* but this deviation is of very rare occurrence as a congenital malformation, and it may perhaps be doubted whether the effects of disease have not been mistaken for such. We shall presently see that this alteration in the position of the heart is, as was remarked by Bertin, constantly produced by the enlargement of that organ from hypertrophy.

b. The heart has occasionally, though very rarely we believe, been found in the centre of the thorax, occupying a vertical position, as in quadrupeds. A case of this kind is described by Breschet.† The infant was born at the full time, lived six weeks, and exhibited no external malformation: the heart, which was composed of a single auricle and ventricle, was situated exactly in the median line of the thorax, its apex having a slight inclination towards the left side. Another case, described by Klinn,‡ is usually quoted as an example of this species of malposition; but there can be little doubt, even from his own description, that the displacement of the heart was caused by the pressure of an effusion which had taken place into the left sac of the pleura.

c. A much greater alteration in the position of the heart, where the organ was so completely subverted that its basis was inferior and its apex superior, is related by Ignatius de Torres. "In a new-born female infant, the heart, destitute of a pericardium, was turned upside down, so that its basis with all the great vessels had fallen down as low as the navel, and its apex, still in the left side, lay hid between the two lungs."§

d. The direction of the apex of the heart to the right side, and the situation of the entire organ more or less to the right of the mesial line, is among the most common of the situations which the heart occupies when out of its usual place.

e. Breschet dissected four cases in the Foundling Hospital at Paris, where the heart

was situated at the right side, without any of the other viscera being transposed.* Otto,† Moellenbrock,‡ Mohrenheim,§ and Elvert,|| have likewise described this species of congenital displacement.

In the greater number of cases where the heart is placed from birth at the right side, there is also a similar transposition of the other thoracic and of the abdominal viscera. A case highly illustrative of this general transposition of the viscera is recorded by Dr. Bryan in the Transactions of the College of Physicians of Dublin, and the specimen is preserved in the superb museum of the College of Surgeons of that city.

The apex of the heart, instead of pointing towards the left, corresponded to the interval between the fifth and sixth ribs of the right side; its auricles and ventricles occupied a position exactly the contrary of their ordinary relative situations; and the aorta, which gave off those vessels to the right that it usually furnishes to the left, descended along the right side of the vertebral column. The left lung was divided into three lobes, while the right had only two. The pyloric orifice of the stomach was turned towards the left hypochondrium, which was occupied by the liver, the spleen being at the right side. The whole intestinal tube was transposed in like manner, the caecum resting on the left iliac fossa, &c. &c. In short, all the parts usually situated at the right side were placed at the left, and *vice versa*.

The subject of this case, we are informed, was a woman advanced in life, who had borne several children, and enjoyed good health until a short time before her death. The appearances found on dissection in the kidneys, uterus, and bladder, sufficiently accounted for the symptoms under which she suffered; but no suspicion was entertained that there existed any thing peculiar in her conformation, nor did the displacements lead to any particular symptom—not even to a preference of using her left hand.

We have been informed by Dr. Kenedy that a respectable middle-aged female presented herself last summer at the Dublin General Dispensary, complaining of dyspnoea and distressing palpitations. On examination with the stethoscope, it was discovered that the heart was pulsating at the right side, and no disease could be detected in any of the thoracic viscera to account for the displacement; in addition to which the woman positively avowed that she had felt her heart beating in the same place as long as she could remember. The physician to whom we are indebted for these particulars seemed to entertain little doubt that the displacement in this case was congenital.

The second class of congenital displace-

* Mémoires de l'Académie des Sciences, quoted by Breschet.

† Mémoire cit. page 17.

‡ Acta Academiæ, Cæs. reg. Joseph. tom. 1, page 228.

§ Phil. Trans. abridged, vol. viii. p. 509.

* Op. cit. page 10.

† Handbuch der pathologischen, &c. Breslau, 1814.

‡ Miscell. natur. curios. dec. 1. ap. obs. 76.

§ Wiener Beiträge, etc. tom. 2, pag. 305.

|| De phthisi pulmonali, etc. Tubing. 1780.

ments of the heart, comprising those cases of malformation in which that organ is situated out of the cavity of the chest, may be divided into those where the heart is situated on the surface of the body, and those where it is situated in the interior, but not in the thorax.

"The first kind, in which the heart is on the outside of the body, includes some of the most fatal as well as most frequent cases of exposition of this organ. It is generally connected either with deficiency in the diaphragm and abdominal muscles, or with absence of some part of the walls of the thorax. In the former case, we generally find the heart, liver, and stomach, and often the lungs, and all the abdominal viscera, contained in a sac, sometimes covered only by peritoneum,* sometimes by an extension of the common integuments,† and sometimes occupying the sheath of the umbilical cord,‡ forming a variety of umbilical hernia."§

Protrusion of the heart may likewise take place through a fissure, or deficiency in the sternum or ribs. Some cases of this description are quoted by Breschet in the *Mémoire* already so often alluded to; they seem to have arisen principally from a deficiency in the lower part of the sternum from the imperfect development of that bone, and were not accompanied with any other malformation. Such cases are, however, exceedingly rare in comparison with those where the fissure of the sternum and the protrusion of the heart through it is accompanied with other malformations arising from a defective development of the parietes of the different cavities from the circumference towards the centre, such as large apertures in the parietes of the chest and abdomen with hernia of their contents, spina bifida, cleft palate, hare-lip, open perineum, &c.

When the heart is situated in the interior of the body, but not within the chest, it may be found either in the abdomen or in the neck.

Heart situated in the abdomen.—Ramel relates the case of a girl ten years of age, whose heart was placed from birth below the diaphragm, in the situation usually occupied by the stomach. During infancy she did not appear to suffer any inconvenience from the malposition, and as she grew up it was only on crying violently, or using any particular exertion, that she was seized with palpitations, dyspnœa, and occasionally with epistaxis. Ramel attended her for two years, during which time her health and strength continued to improve, until it seemed at length as if nature had become completely reconciled to this unusual arrangement of the circulating system.|| Another case of this species of malposition of the heart was found by Doctor Wilson in an infant seven days old.¶ The central and tendinous portion of the diaphragm was deficient, as was also the inferior portion

of the pericardium. The heart, consisting of a single auricle and ventricle, was lodged in a deep groove on the convex surface of the liver. In this case there were several other malformations of the principal bloodvessels, as well as of the abdominal viscera, which were sufficient to account for the death of the individual, independently of the displacement of the heart. But the most extraordinary case of this kind on record is that related by M. Deschamps,* where *the heart was found occupying the place of the left kidney*. The individual in whom this malformation was found was an old soldier who had served several campaigns, and enjoyed excellent health, with the exception of nephritic pains, to which he had then been for some years subject, and on account of which he eventually obtained his discharge from the service. Notwithstanding the frequent recurrence of these pains, he married, and became the father of three children; at length, however, the symptoms of renal disease became more violent, and recurred more frequently; hectic fever set in, and he died after an agony of forty hours; his abdomen covered with large gangrenous spots. On dissection, the right kidney was found very large and in a state of suppuration; the place of the left kidney was occupied by the heart, enveloped in its pericardium. In the thorax, there was no trace of the heart to be found, nor was there any appearance to indicate its ever having been placed there. It is remarkable that this extraordinary displacement of the heart was never discovered or even suspected by the individual or his medical attendants, all the functions of the heart being as effectually and as regularly performed as though it had occupied its natural position within the thorax. It does not appear that there was any malformation of the diaphragm, or indeed of any other part in this instance.

Heart situated in the neck.—In M. Breschet's excellent *Mémoire* on this subject, three cases of this extraordinary malformation, which he proposes to designate *ectopia cordis cephalica*, are related. In one of these cases the heart, lungs, and thymous gland, were all situated in the front of the throat, where they formed a large tumour immediately underneath the lower jaw. The apex of the heart was attached to the base of the tongue, and lay between the rami of the inferior maxilla. The chest was filled with the abdominal viscera, which had passed up through an aperture in the diaphragm. As such complicated malformations are manifestly incompatible with the extra-uterine life of the individual, their description can afford little practical interest to the physician; we shall, therefore, content ourselves with thus briefly noticing the existence of this variety of congenital displacement, and refer the scientific anatomist to the original essay on the subject by M. Breschet.

Without entering at length into the causes of the different varieties of congenital malposi-

* Archives Générales, tom. 23. p. 511.

† Meckel, Dissert. inaugur. page 6, Acta Helvetica, vol. vii. p. 56, de foetu monstr. &c.

‡ Rep. Gén. d'Anat. tom. ii. p. 25.

§ Paget, op. cit. p. 33.

¶ Journal de Médecine, tom. xlix. p. 423.

¶ Phil. Trans. 1798, p. 346.

* Journal Général de Médecine, etc. tom. xxvi. p. 275.

tion of the heart, which would be the more unnecessary as the subject will be fully considered in a separate article on MALFORMATIONS of that organ, we may remark in general terms, that the greater number of these congenital misplacements depend on an arrest of development at a period before the evolution of the fœtus is completed. In this way may be explained the imperfect union of the parietes of the different cavities, and the consequent displacement of the organs usually contained within the thorax and abdomen, their protrusion out of these cavities, &c.; to this cause may also be attributed, with considerable probability at least, the situation of the heart in the neck; as all writers on the development of the embryo are agreed that the heart is situated immediately underneath the head during the first period of the evolution of the fœtus, and that the aorta, instead of forming an arch, descends directly into the chest. It is obvious that if the development of the heart be arrested at this early period, the organ will remain out of the thorax, in the anterior part of the throat, as in the *ectopia cephalica* of Breschet.

We must not, however, suppose that all congenital misplacements of the heart may be thus accounted for, as there are some which evidently result from a perversion of the natural order of development: to this class belong the inclination of the heart's apex to the right, and the total transposition of the organ to that side, accompanied, as it usually is, with a similar transposition of the other viscera. In this way, also, we must explain the situation of the heart in the place of the kidney in the remarkable case recorded by Deschamps, inasmuch as the organ never occupies that position at any period of the evolution of the fœtus, and, *a fortiori*, could not continue to occupy that position in consequence of an arrest of its development; neither was there any malformation or disease of any of the neighbouring viscera to account for the displacement.

II. Displacement of the heart may likewise be occasioned at any period of life by accident or by disease. Displacement from the former cause seldom falls under the observation of the physician, as any accident which is of sufficient violence to force the heart out of its natural situation seldom fails to prove instantaneously fatal. Indeed, the only recorded exception that we are aware of is furnished in the remarkable "case of probable dislocation of the heart from external violence," published by Dr. Stokes in the *Edinburgh Medical and Surgical Journal*, No. 103, from which we copy the following account:

"Mr. B., æt. 21, had enjoyed uninterrupted health until the 7th of May, 1822, when he was severely crushed between a water-wheel and the embankment on which the axle was supported. He remained for three hours after the accident in a state of complete insensibility. As soon as an examination could be made, the following injuries were discovered. Two ribs in the lower portion of the left side, the right clavicle and humerus, and the fifth, sixth, and seventh ribs on the right side, were broken. The

right side of the face and chest was emphysematous, and there was complete paralysis of motion in the right arm, with considerable loss of sensation. *The patient felt great pain in the right side of the chest, with a sensation as if a foreign body preventing respiration had been introduced into the right lung: the pain was accompanied with violent throbbing and heaving, and it was soon discovered that his heart was pulsating at the right side of the sternum.* He had a short dry cough, but experienced no hemoptysis; and there was no pain or other symptom of pleuritic inflammation at the left side,—a point of considerable importance in the diagnosis of the lesion.* From that period to the present his heart has continued to pulsate on the right side of the sternum, the pulsation being generally strong, and aggravated by mental emotion, exercise, or the occurrence of pain in the side. He has never had orthopnoea, but has always experienced great difficulty of breathing on exercise, or when he has attempted to lie on the left side. Since the accident he has every winter experienced several inflammatory attacks, in which he suffers from violent pain of the right side, with great increase of palpitation and dyspnoea. These attacks are only relieved by bleeding, and he thinks he has been bled upwards of fifty times. It is a remarkable circumstance that syncope has never been produced even after the loss of so much as thirty ounces of blood at a time, and that he has taken the powder of digitalis in the dose of eight grains every night for the space of three months, without his pulse ever descending below eighty. When he does not take digitalis, his pulse is generally between one hundred and one hundred and twenty, regular in strength and never intermitting; but when he uses that remedy in his ordinary state, the number of respirations is about thirty in the minute. His habit of body is spare but muscular, and the countenance is not expressive of pain. From August to the latter end of April last he shared constantly in the sports of the field: hunting and shooting were his constant employments.

"On stripping the patient and examining his chest carefully, the right shoulder appears depressed, but the right side inferiorly measures an inch in circumference more than the left.

"The left side of the thorax sounds perfectly clear, even to its most inferior portion, and in the situation usually occupied by the heart. Respiration of the puerile character, and mixed with some bronchial râles, is to be heard over the entire lung, and is as distinct in the mammary region as in the other portions. Neither the sound nor impulse of the heart is perceptible in the cardiac region. At the right side the upper portion of the lung

* We had lately an opportunity, through Dr. Stokes's kindness, of examining this patient, and of ascertaining the accuracy of the above statement. The patient, when interrogated, stated without the least hesitation, that before the accident his heart had always beat at the left side, and that he was himself the first to notice its change of position after that event.

sounds clear, but from the fifth rib downwards there is complete dullness, and here the integuments are exquisitely sensible. In the upper portion, both anteriorly and posteriorly, the respiratory murmur is of the same character as in the opposite lung, but from the fifth rib downward it is wanting; there is no bronchial respiration or resonance of the voice. The pulsations of the heart can be seen and felt in the right mammary region, between the sixth and seventh ribs, and within an inch of the sternum. When not over-excited the sounds of the heart are almost natural. There is no sign of valvular disease."

That the heart was actually displaced in this case, there can be no doubt whatever; and that the displacement was caused by the external injury is rendered highly probable, from the fact of its being observed for the first time almost immediately after the accident, and from the absence (as ascertained by auscultation and percussion) of all those diseases of the adjacent parts which usually cause the displacement of the heart from the left to the right side.

Besides the causes of displacement already enumerated, viz. congenital malposition, and accident or external injury, the heart is likewise liable to be forced out of its natural situation by various morbid alterations of the adjacent parts.

On studying the anatomical relations of the heart, we perceive that it is retained *in situ* by the large bloodvessels which form its superior attachment,—by the adhesion of the pericardium to the diaphragm, which attaches it inferiorly,—and by the walls of the mediastinum and the equal pressure of the lungs, which oppose its displacement to either side. But as none of those forces which retain the heart in its natural position is of a fixed or unyielding nature, it follows that, whenever a degree of pressure sufficient to overcome their resistance is exerted on the heart by the enlargement or other morbid alteration of any of the surrounding parts, that organ is pressed out of its natural situation, and forced upwards or downwards, to the right or left side, according to the direction in which the pressure is exerted.

The following are the diseases which have been observed most frequently to cause displacement of the heart.

1. *Effusion into the sac of the pleura.*—In nine cases out of ten where the heart is removed out of its natural situation, the displacement will be found to have arisen from empyema or pneumothorax; accordingly this displacement is now generally regarded as the most constant and least fallible symptom of these diseases. Of twenty-seven cases of empyema and pneumothorax that have come under the author's observation in the extensive hospitals attached to the Dublin House of Industry, the heart was perceptibly displaced in every instance. Pathologists have long remarked that effusion into the left pleura, by the pressure which it exerts on the parietes of the cavity, as well as on the organs contained within it, is capable of thrusting the heart over

to the right side of the sternum; but they do not seem to have been aware that effusion into the right side, by protruding the mediastinum and pressing on the heart, may cause a very considerable displacement of that organ to the left of its natural position. In a case of pleuropneumothorax, with fistulous communication through the lung of the right side, which was lately operated upon by Mr. Mac Dowel, in the Richmond Hospital, the heart was distinctly seen and felt pulsating between the fourth and fifth ribs, near the left axilla, from which situation it gradually returned to its natural position, as the pressure which caused its displacement was removed by drawing off the air and fluid from the opposite side. In all cases of extensive effusion, whether of air or fluid, into the pleura of the right side, we have uniformly observed a similar displacement of the heart proportioned to the extent of the effusion. This displacement of the heart to the left can in some cases only be detected by minute examination, and even in extreme cases is less likely to attract observation than the displacement to the right of the sternum, which seldom fails to arrest the attention of the patient, even though it should be overlooked by his medical attendant. We have already entered at length into the consideration of the value of this symptom as indicative of effusion into the pleura, and shall therefore refer the reader to the article *EMPHYEMA*, where he will find this subject fully considered.

2. *Aneurism of the aorta.*—When tumours of this kind come in contact with the heart, they seldom fail, as they increase in size, to force it to a greater or less distance from its natural position. Dr. Hope records a case of aneurism of the ascending aorta displacing it to the left. The writer has seen an instance of aneurism of the arch thrusting the heart downwards, so that its apex pulsated in the epigastrium. It is evident from their relative anatomy that aneurism of the thoracic aorta may cause displacement of the heart according to the direction which the sac takes; and Drs. Graves and Stokes have shewn that considerable displacement of the central organ of the circulation may be produced by aneurism of the abdominal aorta pressing up the diaphragm and pericardium. In the interesting case which they have recorded, "the heart was at first found to beat in the epigastrium, the impulse having left the usual situation. In the course of a few days it became feebler in the epigastrium, but could be felt pulsating on the right side, at the sternal end of the fifth rib, and ultimately became fixed in the intercostal space of the third and fourth ribs."*

We may remark that in two cases of aneurism of the ascending aorta which we had lately under our care, the sac presented a double sound at each pulsation: in neither case was there any perceptible displacement of the heart, as the tumour took a direction upwards and to the right side; but in one of the cases which we subsequently had an op-

* Dublin Hosp. Reports, vol. v. p. 10.

portunity of inspecting, we ascertained that the aneurism was in actual contact with the pericardium and heart, from which no doubt it received and transmitted the double pulsation. In two cases related by Drs. Graves and Stokes,* the aneurismal tumour gave a double pulsation; and we believe that a similar phenomenon will be observed whenever the aneurism is so situated as to have the double stroke of the heart mechanically communicated to it.

3. *Tumours*.—Tumours of every description developed in the vicinity of the heart, when they take such a direction and attain so great a size as to press upon that organ, may mechanically displace it. In a young woman who died in the Hardwicke Fever Hospital with symptoms of acute thoracic inflammation, we found on dissection, at which we were assisted by the late Professor Bennet, a large *encephaloid* tumour, which appeared to have originated in the bronchial glands situated at the root of the left lung, and thence to have descended between the pleura and pericardium, thrusting the heart over into the right side, and eventually eating its way by ulceration through the pericardium, where its irruption excited violent inflammation. A similar displacement of the heart, and apparently from a similar cause, was found by Boerhaave on the dissection of the Marquis de St. Auban.†

4. *Pulmonary emphysema*.—Laennec states, "that when a single lung is affected, it sometimes becomes so much more voluminous than the other as to press aside the heart and mediastinum."‡ Judging, however, from our own experience, we feel inclined to rank this among the least frequent causes of displacement of the heart, as in most instances where one lung is sufficiently emphysematous to produce such an effect, the other participates in the morbid alteration, and by its increased volume maintains the pressure which the heart sustains in equilibrium: such at least we have found to be the case in the numerous dissections that we have made.

5. *Diaphragmatic hernia*.—It is evident that when the abdominal viscera are forced into the thorax through an opening in the diaphragm, they may exert such a degree of pressure on the heart as to force it from its natural position. This species of hernia is often congenital, and arises from imperfect development of the diaphragm, in consequence of which an aperture is left, through which several of the abdominal viscera are protruded into the chest by the contraction of the abdominal muscles. We have already recorded examples of congenital ectopia from this cause. It seldom happens that such subjects survive longer than a few hours after birth, in consequence of the obstruction which the respiration encounters. Instances, however, are not wanting of life being prolonged for a considerable period under these apparently hopeless circumstances. In Dr. Wilson's

case already quoted, the infant lived some days; but decidedly the most interesting case of this description on record is related by Drs. Graves and Stokes.

"A man about forty years of age died of tubercular phthisis. The œsophagus, after passing through the usual opening in the diaphragm, was found to re-enter the thorax by another very large opening in the tendinous portion towards the left side. The stomach occupied the inferior portion of the left thoracic cavity, its cardiac and pyloric orifices both lying in the opening. A considerable portion of the transverse arch of the colon was also included in the left side of the chest: these viscera, loosely but permanently fixed by means of the serous membranes, all rested on the convex surface of the diaphragm, and *pushed the heart and mediastinum towards the right side.*"* There seems little doubt that the hernia in this case was the result of congenital malformation. Hernia of the abdominal viscera into the thorax, and consequent displacement of the thoracic viscera, has likewise been caused by wounds of the diaphragm,† by rupture of that septum occasioned by a fall; by great exertion;‡ and, as has been alleged, by enormous distention of the stomach.§

6. *Enlargement of the liver*.—This is also enumerated by authors among the occasional causes of displacement of the heart; we are not, however, acquainted with a well authenticated instance of the kind. It is probable that a considerable hypertrophy of the left lobe may elevate the diaphragm and displace the heart; the same effect may likewise be produced by excessive enlargement of the spleen, or by the development of any morbid growth in the epigastrium or left hypochondrium.

7. *Hypertrophy with dilatation of the heart*.—When the heart is enlarged, its apex is carried to the left, and its basis to the right side, in such a manner that it lies almost transversely across the chest. This observation, originally, we believe, made by M. Bertin,|| has been repeatedly verified by the writer. It has also been remarked by Bertin that in those cases where the size and weight of the heart are very considerably augmented, the organ presses with all its weight on the diaphragm, so that that portion of the septum on which it reposes is thrust before it like a pouch in the abdomen. Sometimes this depression has been known to take place without any visible cause, in which case the affection has received the name of *prolapsus* of the heart.¶ Some authors have thought that this prolapsus might be caused by relaxation of the vessels, by which the heart is as it were suspended in situ.** We think it more probable, however, that the displacement in such cases must have been more apparent

* Op. cit. p. 84-5.

† Essai sur l'Anatomie Pathologique, par J. Cruveilhier.

‡ Richter, On Hernia.

§ Haller, Disput. Chirurg. tom. iii.

|| Traité des Maladies du Cœur, pl. 2me.

¶ Laennec, op. cit. p. 615.

** Bertin, op. cit. p. 442.

* Op. Cit.

† Zimmermann, Traité de l'Expérience, tom. iii.

‡ Forbes's Translation, p. 152.

than real, as we know from experience that the heart's pulsation may be felt in the epigastrium in a great many persons, particularly when the sternum is short, although the heart retains its natural position.

Diagnosis and treatment.—Displacements of the heart are now easily detected by the aid of auscultation and percussion: the disappearance of the usual phenomena of the heart's action from the cardiac region, and their appearance in another and different situation, afford unerring evidence of a corresponding change in the position of the organ. As, however, the changes of position which the heart undergoes are, in every instance almost, the effect of more serious organic lesions, their diagnosis becomes a matter of very secondary importance, as compared with that of the disease by which they were caused, and of which they should properly be regarded as a symptom. Indeed, the principal advantage, in a practical point of view, of detecting a displacement of the heart, is derived from the light which it throws on the nature, extent, and situation of the primary disease by which it was produced, and on which the danger of the displacement, as well as its appropriate treatment, in a great measure depends. It is therefore to the accurate diagnosis of the cause of the displacement that the scientific physician will chiefly direct his attention; these causes we have already enumerated, and we beg to refer the reader to the respective articles which treat of the particular diseases, for such diagnostic characters as may enable him to decide in any doubtful case the true cause of the displacement.

From the circumstance of displacement of the heart being so constantly combined with other and more serious lesions, it is extremely difficult to ascertain the effects on the system resulting from the simple displacement. In *congenital malpositions* the alteration in the heart's place is usually coupled with other malformations of a more serious character, which either cut short the life of the individual, or else complicate the symptoms of the displacement in such a way that it is impossible to analyze them correctly. In those rare cases where the displacement of the heart was the principal or only deviation from the natural arrangement of parts, little or no inconvenience seems to have resulted from it. In Ramel's case already quoted, where the heart was situated below the diaphragm, the individual experienced no inconvenience during infancy; as she grew up she occasionally suffered from palpitations and dyspnoea, and at the age of twelve she is represented to have enjoyed as good health as other people. M. Deschamp's case affords a still more remarkable example of the absence of any distressing symptoms from the displacement, though the heart was situated in the place of the left kidney. In this case the great vessels were disposed in the most favourable manner for transmitting the blood from the heart; but when the displacement is caused by accident or disease, the large vessels are necessarily contorted more or

less, in order to accommodate themselves to the new position of the heart; and if to this we add the pressure and consequent obstruction to the due discharge of their functions which the parts that the heart is forced amongst necessarily sustain, we shall see sufficient reason for concluding that the consequences must be most serious and detrimental when the displacement is at all considerable; but even to those untoward circumstances the powers of nature are capable of adapting themselves. In Dr. Stokes's case the patient, though occasionally subject to palpitations in the *right side*, has so much improved in health as to spend his time between shooting and fox-hunting. In all cases of displacement that we have seen the pulse was rapid and feeble, and the patient suffered from occasional attacks of dyspnoea and palpitation; but in each of these cases the displacement was complicated with empyema or pneumothorax, either of which was of itself sufficient to produce these symptoms. In general, however, we observed that they were immediately relieved by drawing off the fluid, and allowing the heart to resume its natural position. We are, therefore, disposed to conclude that slight displacements occasion little inconvenience, but when considerable they may produce serious functional derangements, especially until such time as the system has become habituated to the change.

The treatment of displacement of the heart must obviously depend on its cause; where that is of such a nature as to admit of removal, no sooner is its pressure taken off than the heart resumes its natural position, unless retained by morbid adhesions. When, on the other hand, the cause of the displacement does not admit of removal, the replacement of the heart is impracticable; and all that the resources of our art can effect is to palliate symptoms as they arise. In all our attempts, therefore, either to restore the heart to its natural position, or to mitigate the symptoms which its displacement produces, we should ever bear in mind that we are only treating a symptom—a mere mechanical effect of pressure; and that, by relieving the primary disease which caused the pressure, we take the most effectual method of remedying the displacement it produces.

On referring to the list of diseases we have enumerated among the causes of displacement, it will appear that many of them, such as aneurisms of the aorta, tumours developed within the thorax, &c. are of such a nature as not to admit of removal or diminution. Congenital malposition is equally irremediable: even in those cases where the heart was placed in front of the chest, immediately under the integuments, it was found that the attempt to force it into the thorax through the fissure in the sternum immediately brought on the most alarming symptoms.* In all such cases our best resource lies in the palliative treatment. The patient should be kept as quiet as possible, and every other precaution adopted to prevent

* Breschet, Mém. cit.

the circulation being excited. When palpitations are troublesome, digitalis may be administered with advantage; its exhibition, however, requires considerable attention, as it has been observed not to produce its effects in such cases unless administered in full doses, and we have witnessed the most alarming consequences from its over-action. Counter-irritation may likewise be employed with advantage; we have repeatedly found blisters applied over the heart most efficacious in controuling this symptom: when a more permanent effect is desirable, a seton may be introduced in the side near the heart. Dr. Stokes's patient, when we last saw him, declared that he experienced the most decided relief after the introduction of a seton into his right side, and that on one occasion when he withdrew it for a fortnight he was attacked with his former symptoms of pain and palpitation, which again disappeared after the seton had been introduced.

We have already stated our opinion that effusions into the pleura are decidedly the most frequent cause of displacement of the heart. By the operation of paracentesis thoracis these may no doubt be removed; but in deciding on the expediency of this operation there are many circumstances of greater importance than the displacement, which the physician must take into consideration. (See EMPYEMA.)

In the case of diaphragmatic hernia, Laennec suggests the idea of making an incision into the abdomen and drawing back the intestines. We conceive that if such an operation could ever be justifiable, it would only be when the pressure of the abdominal viscera on the lungs threatened immediate suffocation, in which case a doubtful remedy might perhaps be preferred to none: but how are the intestines to be prevented from again returning into the chest through the aperture in the diaphragm?

(R. Townsend.)

HEART, FATTY AND GREASY DEGENERATIONS OF.—In individuals of great obesity, and occasionally in others of only moderate *embonpoint*, the heart is sometimes overloaded with fat. It is deposited beneath the pericardium, and not only invests the organ externally, but frequently penetrates a considerable depth between the muscular fibres, which, as if losing (probably by the pressure) what the adipose tissue gains, become attenuated and flabby. Sometimes, however, the intermixture of adipose matter gives the appearance of attenuation, though there is none in reality.

The older authors imagined that this affection was the cause of more or less severe symptoms, and even of sudden death. Corvisart thinks that an enormous accumulation might sometimes be capable of producing such an effect; but, in the persons in whom he had met with very fat hearts, he had seen nothing which could prove to him "that the state was morbid, that is to say, carried to such a point as con-

stantly to derange the function of the organ and thus constitute a malady." The experience of Laennec has led him to the same conclusions; nor have we seen any thing that militates against them.

It would be natural to suppose that the substitution of adipose for muscular tissue, and the extreme attenuation which the walls, especially the apex and the posterior part of the right ventricle, sometimes undergo from this cause, would be eminently favourable to rupture of the organ; yet this accident is very rarely the result. Morgagni has seen an instance of it, but Bertin has only met with one of rupture of the auricle; while Corvisart and Laennec have not witnessed an instance at all.

Fatty degeneration is different from that denominated *greasy* degeneration of the heart. This, according to Laennec, is "an infiltration of the muscular substance with a matter which presents all the physical and chemical properties of grease;" it is an alteration exactly similar to the greasy degeneration which Haller and Vicq-d'Azyr have observed in the muscles. Laennec has never found it but in a very small portion of the heart, and only near the point. It was of a pale yellowish colour, like dead leaves, and therefore very similar to certain varieties of softening; but he thinks that it may be distinguished from softening by its strongly greasing paper between which it is pressed. We have seen a remarkable case in which a degeneration of this kind occupied the greater part of both ventricles.

(J. Hope.)

HECTIC FEVER.—See FEVER.

HEMATEMESIS.—This term (derived from *αἷμα* and *ἐμῆναι*) literally imports vomiting of blood, and is therefore properly employed to signify hemorrhage from the stomach. Some nosologists, as Pinel and Mason Good, comprise under this denomination every hemorrhage from the alimentary canal, whether the blood is discharged by the mouth or by the rectum. It is, however, more conformable to etymology and to general usage to restrict the name of hematemesis to *gastric* hemorrhage, and to denote *intestinal* hemorrhage by the name of *MELÆNA*, which will therefore be the subject of a separate article. There is, however, much affinity between these two species of hemorrhage; and the two articles will therefore be in some measure mutually supplementary.

Hematemesis is frequently mentioned by Hippocrates. It is clearly described by Aretæus, and distinguished by him from pulmonary hemorrhage. Among the moderns, Stahl, Hoffmann, Morgagni, Tissot, Portal, and subsequent writers, have contributed to its elucidation. Little has been written on the subject by British physicians. Cullen has not even included this disease in his nosological arrangement, on the ground of its being almost universally a symptomatic affection: he has, however, treated of it at some length in his

"First Lines," chiefly with reference to the diagnosis and pathology.

Predisposing causes.—Women are much more subject than men to hematemesis, and are chiefly liable to it during the menstruating period of their lives. Those of a delicate frame, of quick nervous sensibility, or subject to strong emotions, are most prone to this disease; but the sanguine, ruddy, and plethoric are also liable to it as a consequence of defective menstruation. In some females it occurs during pregnancy. Men are seldom attacked by hematemesis at an earlier age than thirty or thirty-five, and very rarely after fifty. It is in them almost invariably induced by habits of life unfavourable to health, especially by close and anxious application to business, combined with indulgence in the pleasures of the table, and neglect of bodily exercise. Organic disease of the stomach, liver, or spleen, and probably also of the pancreas, will constitute a predisposition to hematemesis; and organic affections of the heart, especially valvular disease and dilatation, by retarding the return of the blood, and hence inducing general venous congestion, are a frequent predisposing cause of this as well as of other hemorrhages. When hematemesis has once occurred in an individual, from whatever cause, a predisposition is induced to its recurrence, either spontaneously, or on exposure to some exciting cause which would not in other circumstances have given rise to it.

Exciting causes.—These may be divided into local and constitutional. The *local* causes are such as produce irritation or sanguineous congestion in the mucous membrane of the stomach, and consequent exhalation of blood; or more rarely a physical lesion of the inner surface of that organ, attended with rupture or erosion of a bloodvessel. Sauvages, Frank, and other authors, enumerate a variety of exciting causes of hematemesis, which are confessedly of very rare occurrence, such as the rupture of an aneurism of the aorta, or of some one of its branches, into the cavity of the stomach; the bite of a leech accidentally swallowed; wounds or irritation of the stomach from swallowing a bone, needles, broken glass, &c.; larvæ of insects introduced into the stomach, or generated there; the transmission of an electric shock through the region of the stomach.* Corrosive poisons are well known to induce vomiting of blood. Other acrid substances will probably have the same effect; and thus drastic purgatives and emetics are included in Frank's list of causes, but perhaps only from theoretical considerations. The effort of vomiting, and other violent strains and exertions, as the expulsive efforts in parturition, (*Frank*), are supposed to have produced hematemesis. It is also a well-known effect of severe blows on the epigastric region.

The *constitutional* causes are those which, by

some effect, not always easy of explanation, on the sanguiferous system, produce congestion in the vessels of the mucous membrane of the stomach, or a tendency in the blood to escape from them. Violent and especially *strongly concentrated* mental emotions, as grief, anger, or terror, are undoubted exciting causes of hematemesis, though probably only in the predisposed. In some malignant fevers, in scurvy, and in purpura, hematemesis occurs as a symptom, evidently from a constitutional cause. But the most frequent instance of such a cause operating in the induction of hematemesis, is, where it results from the suppression of some natural or habitual evacuation, especially of the catamenia in females, and of the hemorrhoidal discharge in either sex. The connexion of hematemesis with amenorrhœa has been remarked ever since the time of Hippocrates; and there appears to be no just ground for the denial of this connexion by Dr. Hamilton, in his work on Purgative Medicines. Hematemesis very commonly supervenes on a *suppression*, from whatever cause, of menstruation already established, and which had hitherto observed its regular periods. In other cases it is related to have attended upon *retention* of the menses,* but such instances are comparatively rare. (See AMENORRHEA.)

Symptoms.—The attack of hematemesis is sometimes unattended by any premonitory signs, the vomiting of blood being the first morbid symptom which occurs. But more frequently it is preceded by symptoms similar to those which precede ordinary vomiting; anxiety, faintness, a sense of weight and distention, sometimes amounting to dull pain in the epigastric region; and distressing nausea. The pulse is frequent, but commonly small and weak; and on inquiry it will be found that the bowels are costive.† Sometimes there is general chilliness, with particular coldness of the extremities, vertigo, impaired vision, and ringing in the ears; but several of these symptoms ought, perhaps, rather to be considered as indications that internal hemorrhage has actually taken place, than as precursory signs of its occurrence; for rejection of the effused blood by vomiting does not ensue, until either by its quantity or stimulus it excites the stomach and abdominal muscles to contraction.‡ The blood is then brought up with considerable violence in successive fluid gushes, or partly in solid coagula. Sometimes a single large coagulum is brought up, in fact a mould of the stomach. The quantity rejected by vomiting is always considerable, being seldom less than eight or ten ounces, and sometimes amounting to several pounds. It is highly probable that hemorrhage from the stomach may take place in smaller quantity; but then the blood passes off by the pylorus without giving rise to vomiting. The blood is of various shades of colour, from a deep red to nearly black, according to the shorter or longer

* *Sauvages*, Nosol. Method. *Frank*, de curand. homin. morbis, lib. v. part ii. p. 204. *Edin. Med. Journal*, vol. vii. p. 326. *Percival's Essays*, vol. ii. p. 183.

* *Frank*, op. cit. p. 206.

† *Chomel*, Dictionnaire de Médecine, tom. x. p. 555.

time that it has sojourned in the stomach, and probably from other causes. It is not to be supposed that when the blood is dark-coloured, it is necessarily the result of *venous* hemorrhage. This was pointed out by Aretæus; and it is well known that the fluid, and especially the gaseous contents of the stomach and intestines, will impart a dark colour to blood which remains for any time mixed with them. When there has been a sufficient delay for separation of the constituent parts of the blood to take place in the stomach, membranaceous or polypus-like concretions of fibrin are occasionally brought up along with the blood.* It is often mixed, as might be expected, with alimentary matters, with bile, or with the mucous secretions of the stomach. Most commonly blood is vomited only once in the course of a single accession of hemorrhage; but sometimes a repetition of the vomiting occurs after a short suspension. After the vomiting has subsided, the accompanying symptoms commonly cease, leaving the patient in an exhausted state, with a cold surface, pale countenance, and generally considerable mental agitation and alarm, especially in a first attack. Actual syncope, as Frank has noticed, not unfrequently ensues. Part of the effused blood usually passes the pylorus, and after a few hours produces slight tormina and distention in the course of the intestines, followed by two or three dark-coloured and offensive stools, resembling those in *melæna*. This appearance of the alvine discharge will continue for twenty-four or sometimes forty-eight hours.

Death has very rarely directly ensued from the loss of blood in an attack of hematemesis; but the repeated attacks of this hemorrhage have necessarily a tendency to weaken the constitution, particularly when it is not of a vicarious character. Sometimes after a single attack there will be no recurrence of hemorrhage; but more commonly, as we have already observed, a predisposition to its return is induced, and it will after some interval reappear, either spontaneously, or on the application of some exciting cause; or it will assume a periodical or chronic form, according to the nature of the local, constitutional, or organic cause by which it is kept up.

From the above account of the causes and symptoms of hematemesis, it will appear that it has generally the character of a *passive* hemorrhage. Sometimes, however, it occurs in individuals of vigorous constitution, is attended with symptoms indicative of increased impetus of the circulation, and puts on the type of *active* hemorrhage. This distinction is not always very clearly marked, but it is highly deserving of attention with a view to the treatment.

Hematemesis has also been divided into *idiopathic* and *symptomatic*; but these epithets have been used by different writers in widely different senses. The most important practical distinction is that derived from the several predisposing and exciting causes, and states

of the constitution, which give rise to the hemorrhage. These it is always highly important to ascertain.

Pathology.—As the general doctrine of hemorrhagic diseases will be developed in another place, (see *HEMORRHAGE*), we shall confine our present inquiry to those circumstances which are peculiar to this individual disease.

Hematemesis, when unconnected with organic lesions, so very rarely proves fatal, that anatomical investigation has thrown but little light on the state of the stomach and its mucous membrane in this disease. Frequently no morbid appearance whatever can be detected in patients who have died very shortly after profuse hematemesis. In other cases, *redness* of the mucous membrane could alone be discovered; but this may be the effect of simple infiltration of blood, while in other cases it may denote a congestive, or even an inflammatory state of the mucous membrane, which has caused the hematemesis. In some of the dissections recorded by Morgagni and Portal, the stomach and other viscera, after profuse hematemesis, were found remarkably pale. Some observers have recorded a dilatation of the venous and arterial branches supplying the stomach as a common appearance after death from hematemesis, and the veins ramified on the internal surface of that organ have been even described as in a varicose state; but these allegations are destitute of adequate proof.

In those cases of hematemesis which are connected with organic affections, whether of the circulating system or of the abdominal viscera, the appearances proper to these diseases will of course be met with after death. Where the hematemesis has arisen from organic disease of the stomach itself, it has commonly been supposed that it was the consequence of ulceration, producing the rupture or erosion of one or more bloodvessels. Such cases, no doubt, are occasionally met with; but it is no less certain that scirrhus of the pylorus often proceeds to extensive ulceration without the occurrence of any hematemesis; and on the other hand, as Andral from ample experience assures us, that scirrhus affections of the stomach are attended with repeated hematemesis during their progress, where, on dissection, no ulceration nor lesion of continuity in the mucous membrane or its vessels is observable.*

Hematemesis is, then, an instance of *exhalation* of blood from a mucous surface, analogous to what happens in epistaxis and hematuria, in uterine and many cases of pulmonary and bronchial hemorrhage. The causes which occasion this exhalation are referred by Andral to four heads:—1. a mechanical obstacle to the return of the venous blood through the system of the vena portæ;—2. irritation of the mucous membrane of the stomach;—3. sanguineous congestion, not referable to either of the former heads;—and, 4. certain states of the blood itself, in which it is so changed as to

* Frank, op. cit. p. 202. Dict. de Méd. loc. cit.

* Andral, Pathol. Anat. trans. vol. ii. p. 179.

have a universal tendency to escape from its vessels.*

Mechanical congestion is instanced (1.) in those cases of hematemesis which depend on enlargement or induration of the *liver*, and sometimes also of the *spleen* or *pancreas*, in consequence of which the trunk or branches of the *venæ portæ* are more or less directly compressed, and the return of the blood from the stomach impeded: hence congestion in its vessels and hematemesis ensue. (2.) In cases depending on obstructed circulation from organic disease of the *heart*, and more especially from morbid alterations in its valves, or dilatation of its cavities, in consequence of which the return of the blood by the *vena cava* is impeded, and general venous plethora is induced.† Such a state is now well ascertained to be a frequent cause of hemorrhage, especially from the lungs, the stomach, and the uterus; and its existence is a circumstance deserving of the most careful attention of the scientific practitioner.

Irritation of the mucous membrane is the direct cause of the hematemesis arising from corrosive poisons and other acrid substances.

To *simple congestion* we must, in the present state of our knowledge, refer all those cases of hematemesis which are considered as *idiopathic*, including those which are *vicarious* or *auxiliary* of suppressed or diminished menstruation, &c. "The blood," says Andral, "accumulates in some part of the mucous membrane, and escapes from its vessels, which is all that we can discover."

The subject of *morbid changes of the blood* will be discussed in other parts of this work. (See BLOOD, PURPURA, SCURVY.) Andral instances, as cases where hematemesis results from this cause, "certain cases of poisoning by absorption," typhous fevers, and the black vomit in yellow fever.

Diagnosis.—Hematemesis is in general easy to be recognized by the symptoms already enumerated. It is occasionally liable to be confounded with hemoptysis. "It may be certainly known," says Cullen, "that the blood proceeds from the stomach, and not from the lungs, when it is manifestly brought up by vomiting, and not by coughing; when the vomiting has been preceded by some sense of weight, anxiety, and pain in the region of the stomach; when the blood brought up is of a dark and grumous appearance; and when it is manifestly mixed with the contents of the stomach."‡

When, also, cough and the other local and constitutional symptoms of pulmonary hemorrhage are absent, we may in general safely conclude the case to be hematemesis. There are, however, several circumstances which may tend to perplex the diagnosis. Cough and vomiting will materially excite each other; and when they jointly occur, it may not be easy to decide which is the primary symptom,

and by means of which of them the blood is brought up. In very profuse hemoptysis the muscles of the thorax will sometimes contract convulsively, so as to send forth the blood in successive gushes, closely resembling what takes place in true vomiting of blood; or the blood brought up by coughing may tickle the fauces, and excite actual vomiting. On the other hand, blood brought up by vomiting may be driven back into the glottis, and excite violent cough. We must also recollect, in order to guard against all error in diagnosis, that the blood, though actually vomited up from the stomach, may be originally derived from a different quarter, as in the case of aneurism already adverted to, or where blood proceeding from the fauces or posterior nostrils has been swallowed during sleep, or is transmitted from a vomica in the lung by a fistulous canal into the œsophagus, as in a remarkable case related by Dr. Mackintosh.*

Hemorrhage from the stomach, as has been already mentioned, does not necessarily imply the rejection of the blood by vomiting; for in the first place the quantity of blood exhaled into the cavity of the stomach may be so inconsiderable as not to excite vomiting, and pass off by the intestines; and, secondly, in very debilitated states of the constitution, the relative loss of blood may be such as instantly to destroy life, before any vomiting has taken place. This chiefly occurs in cases of ulceration of the stomach, which organ is found after death distended by an enormous coagulum. Such cases are not of very rare occurrence.

The diagnosis of hematemesis is not complete for practical purposes until we have endeavoured to ascertain to what specific cause the hemorrhage is to be ascribed, and whether it be idiopathic or symptomatic, connected with organic lesion or simply with deranged function, and whether it partakes of the character of *passive* or *active* hemorrhage. Attention is therefore required to what has been pointed out on these several heads.

Prognosis.—Hematemesis is always a disease of formidable and alarming appearance, from the quantity of blood which is lost, and the delicacy and importance of the organ concerned. Experience, however, instructs us that in many cases it is attended with little danger. Hematemesis which is vicarious or supplementary to menstruation is usually a very manageable complaint; though we cannot go so far as some of the older authors, who considered it as absolutely salutary, and not to be interfered with.‡ Where, on the other hand, it is not imputable to suppressed evacuations; where it shows a tendency to assume a chronic form; where it is attended with fever or indications of organic lesion; hematemesis is a disease of considerable danger, and very difficult of cure.

Treatment.—The treatment of hematemesis

* Pathol. Anat. transl. vol. ii. p. 179.

† Ibid. vol. i. p. 64.

‡ First lines, § 1017.

* Practice of Physic, vol. i. p. 186.

† Salmuth, Langius, Zacutus Lusitanus, &c. See Dict. des Sciences Médicales, vol. xx. p. 100.

divides itself into three heads:—1. prophylactic measures; 2. those proper at the time of an attack; 3. those suitable in the intervals, or after the hemorrhage has subsided.

1. When warning is given of the approach of an attack of hematemesis by any of the precursory symptoms already noticed, it will be proper to have recourse to timely preventive measures, and especially to prescribe rest and the antiphlogistic regimen, cooling drinks, warm pediluvia or fomentations to the extremities, saline or other purgatives, and, if indicated, the abstraction of blood. Small bleedings have been particularly recommended a day or two before the time at which the catamenia ought to recur, if it is apprehended that they will be replaced by hematemesis.

2. The attack of hematemesis must be met by remedial measures of the same kind as those which are suited to hemorrhagic diseases in general; and their use must be modified by the character of the hemorrhage, the symptoms by which it is accompanied, and the causes which appear to be concerned in its production.

If there are clear indications that the hemorrhage is of an *active* or inflammatory character, venesection must be promptly resorted to, and followed up by purgatives and a strict antiphlogistic regimen. If, on the contrary, the disease puts on a *passive* or asthenic character, and the constitutional powers evince a tendency to sink rapidly, we must have early recourse to the most efficacious astringent remedies, and support the strength by mild but invigorating nourishment, and even cordials, given in small quantities, but frequently. In cases of an intermediate nature, the judicious combination and modification of these two plans of treatment demands the discrimination and skill of the practitioner. Thus it may be necessary to reduce local action by leeches, cupping, and mild laxatives, while proper dietetic means are resorted to to support the strength.

In all cases the most perfect mental and bodily tranquillity must be enjoined, and the patient strictly confined to the horizontal posture, in a cool and well-ventilated apartment, and with as light coverings as possible. Castor-oil, the neutral salts, or more active purgatives, are to be administered according to circumstances; or where the irritability of the stomach forbids their use, laxative clysters must be resorted to, to secure an open state of the bowels. Cold liquids, as lemonade, almond emulsion with nitre, or the super-acidulated infusion of roses, may be given frequently in small quantities, as a tea-spoonful or dessert-spoonful at a time.

In cases where the hemorrhage is so profuse and violent as to threaten serious consequences, more active measures must be resorted to; and none is so deserving of confidence as the free application of *cold*, which is the most efficacious of all astringents, by diminishing the calibre of the bloodvessels and lessening the impetus of the circulation. We must, therefore, not only give the liquids just mentioned, cooled down to 32° by ice or a freezing mixture, but may with great advantage inject

iced water into the rectum, and lay bladders filled with pounded ice on the epigastric region. A very interesting case is related by Michelotti, in the *Philosophical Transactions* for 1731, in which a young gentleman affected with enlarged spleen, and previously subject to epistaxis, was cured of a second attack of profuse hematemesis, in the winter season, by drinking excessively cold water, and taking alimentary liquids iced. The quantity of blood vomited in the space of two hours is said in this case to have amounted to twelve pounds and upwards. By means of occasional small bleedings, a fresh attack was averted for two years, at the end of which period the hemorrhage recurred, and was again subdued by the same means. In the remarks appended to this case, the author cautions us against resorting to this powerful remedy in asthenic or dyspeptic individuals, but strongly advises its use in young and vigorous constitutions, and in the active form of hemorrhage.*

It is, on the contrary, in the *passive* kind, and in relaxed and languid subjects, or where the impetus of the circulation has been already reduced by venesection and antiphlogistic measures, that the vegetable and mineral astringents may with safety and advantage be employed. In hematemesis we have the great advantage of applying these remedies directly to the seat of the hemorrhage; and, therefore, they may be the more relied upon. Preparations containing gallic acid, such as Ruspini's styptic, (which Dr. A. T. Thomson has ascertained to be a solution of this acid in diluted alcohol,) are probably the most useful of the vegetable astringents. But no remedy of this class deserves so much confidence in passive hemorrhage as the acetate of lead given in combination with opium, and in such large doses and at such frequent intervals as to secure its effect. (See *ASTRINGENTS*.) Dr. Elliotson, who strongly advocates the *free* employment of this remedy, also mentions, as one from which he has derived great benefit in hematemesis and melæna, the oil of turpentine, in doses of twenty drops, repeated every three hours.† Subnitrate of bismuth, in conjunction with opium, has also been recommended.

3. After the hemorrhage has subsided, or in the intervals of its occurrence, we must endeavour to obviate its return by removing or weakening the exciting causes, and counteracting the predisposition to the disease. A strict regulation of the diet, (passing very gradually from the mildest liquids to more nutritious food,) rest, quietness, the horizontal posture, cooling and astringent beverages, will be proper for several days after the hemorrhage has ceased. The bowels must be kept properly open by the gentlest and at the same time most effectual means; and there can be no

* *Philosophical Transactions*, vol. xxxvii. p. 129. —Ploucquet refers to two cases cured "gelidissimo potu."—1. *Act. Nat. Curios.* vol. iii. obs. 61; 2. *Comm. Liter. Noric.* 1732, pp. 294, 351, 381. † Elliotson's *Lectures*, *Medical Gazette*, vol. ix. p. 525.

doubt that the recommendation of clysters, to clear the intestines of the blood lodged in their course, so much insisted upon by continental physicians, is a judicious and salutary practice. We cannot, however, in this country, go along with them in their unanimous and strong condemnation of *purgatives* in every case of hematemesis, at least of such as are more active than manna, cassia, and tamarinds. "Quæ vi alvum movendi majore instructa sunt, ea," says Frank, "cane pejus et angue vitanda sunt."* And other continental writers, from Hoffmann down to Pinel, are not less explicit in their reprobation of active, and especially aloetic purgatives.† British practitioners, especially since the publication of Dr. Hamilton's treatise,‡ have placed great confidence in active purging as the best mode of treatment in many cases of hematemesis, more particularly in that form of the disease which occurs in young and middle-aged females, and is connected with uterine torpor and a sluggish action of the bowels. In such cases Dr. Bateman states, as the result of his experience, that the success of Dr. Hamilton's mode of treatment is more decidedly conspicuous than in any other disease in which he has recommended it.|| It is remarkable that the benefit of the purgative plan of treatment is not confined to sanguine and plethoric subjects; it is not less signal in chlorotic and leucophlegmatic habits. It is, however, to female cases exclusively that the observations of Hamilton and Bateman apply; and there can be no doubt that the inconsiderate employment of active purgatives in cases of hematemesis or melæna occurring from wholly different causes, especially in constitutions exhausted by excess, or debilitated by the progress of organic disease, would be highly pernicious. In such cases certainly the more cautious procedure of our continental brethren is to be commended.

With regard to the restoration of the menstrual function where its suspension gives rise to hematemesis, the means by which this is to be accomplished are rather such as act by removing a condition of the general system unfavourable to regular menstruation, than by the employment of specific emmenagogues. If, therefore, the amenorrhœa depend on vascular fullness, we resort to bleeding and suitable purgatives; if on uterine torpor and a chlorotic state, the warmer aperients and tonics, especially the preparations of iron, are to be employed. (See AMENORRHŒA, CHLOROSIS, and EMMENAGOGUES.)

To complete the recovery of the convalescent from the various forms of hematemesis, tonic medicines, a suitable diet, exercise, change of air, and sometimes the use of chalybeate mineral waters, will be highly serviceable. But it is not necessary to protract this article by dwelling on these familiar topics. Freedom

from care, anxiety, and causes of mental irritation, is of the highest importance in all cases, and especially where we have reason to believe or suspect the existence of organic disease. In such melancholy cases the utmost that our art can aim at is to palliate suffering, to ward off the recurrence of hemorrhage, and to protract to the utmost that fatal event which the resources of medicine, however skilfully wielded, cannot hope to avert.

(George Goldie.)

HEMERALOPIA.—See NYCTALOPIA.

HEMICRANIA.—See HEADACH.

HEMIPLEGIA.—See PARALYSIS.

HEMOPTYSIS, from αἷμα, *blood*, and πύσις, *spitting*.—Were it taken in the full latitude of its etymology, the word hemoptysis would embrace every discharge of blood from the mouth, without regard to the sources from whence it originally proceeds; but as the sources are various, use has annexed to the term a more limited signification, restricting it to *expectoration of blood*, or that which originally issues from the respiratory organs. This view of the subject has suggested to some the propriety of substituting the term *pneumorrhagia*, as more definite and precise in its signification. We, however, do not recognize, in the proposed substitution, advantages sufficient to counterbalance the evil of disturbing a well established name. Were we disposed to make any change, it would be to divide the subject into pulmonary hemorrhage and hemoptysis; the former expressive of the more profuse discharges of blood, the latter of the smaller quantities discharged as sputa. Still we prefer the general term hemoptysis taken in its conventional signification.

If there be no subject within the extended field of pathology upon whose precise nature the advancement of anatomical knowledge has thrown more light than hemorrhage, there is unquestionably no organ in the body that has derived more benefit from this circumstance than the organs subservient to respiration, which, both from their organization and from the nature of their functions, are more frequently than any other the subject of hemorrhage.

The term *hemorrhage*, (αἱμορραγία, from αἷμα, *blood*, and ῥήννμι, *to break*,) carries upon its face evidence of the imperfect views which prevailed respecting the real nature of this morbid phenomenon, implying rupture of a vessel to be its essential cause; but experience, so far from establishing this as a general cause, has proved it to be of very rare occurrence, even under circumstances which we should have supposed most likely to produce such a lesion. This pathological error has been kept up in the application of the expression "bursting a blood-vessel." Speculation and vague hypothesis filled up the imperfect measure of information upon this important pathological subject, until the invaluable labours of Bichat redeemed it from error, and placed it in its true light. In explaining the phenomenon of exhalation, he

* Op. cit. p. 221.

† See Dict. des Sciences Méd. tom. xx. pp. 120, 121.

‡ Observations on Purgative Medicines, Edinburgh, 1805.

|| Reports on the Diseases of London, p. 150.

has shown that it is effected through the instrumentality of a system of vessels which are continuous with the arteries, namely, the *capillaries*; that these vessels enter into the composition of all our organs; that they become elements of the several tissues of the body; and that their function consists in separating from the blood a fluid peculiar to the tissue of which they form part. Thus the mucous exhalants separate mucus, and the serous serum; and as long as these vessels continue in the unimpaired enjoyment of their vital properties, so long they only admit the colourless fluids, and refuse entrance to the red particles of the blood; but should these properties be so affected, either directly or sympathetically, that they are either altered or impaired, (changes to which they are especially subject from their being more under the influence of the nervous system than any other portion of the vascular apparatus,) they no longer retain this power of closing themselves against the entrance of red blood. In one case they as it were solicit the presence of this fluid, and in another yield to its forced entrance; in the former instance giving rise to *active*, in the latter to *passive* hemorrhage. Between the first of these morbid conditions and inflammation the closest analogy exists: they recognize the same causes; occur most frequently in the same tissues; have often the same symptoms and terminations; and not unfrequently pass into each other.

These considerations lead to the conclusion that the disposition of an organ to hemorrhage is in a ratio compounded of the development of the exhalant vessels in that organ, and of their exposure to the operation of causes capable of producing those changes in their properties upon which hemorrhage, whether active or passive, is found to depend. Applying this to the lungs, we have a ready and satisfactory explanation of the frequency of pulmonary hemorrhage. These organs combine in themselves every condition favourable to the production of this morbid phenomenon, both in its active and passive form: 1. a considerable extent of mucous membrane, the tissue the most richly furnished with exhalant vessels of any in the animal economy; 2. the constant and immediate relation of this tissue with the atmosphere,—a source of irritation not only from the variations of temperature of which it is so susceptible, but also from the different impregnations with which it is continually charged; 3. a loose spongy parenchyma traversed by numerous bloodvessels of every dimension, freely communicating with each other; 4. the proximity of these organs to the heart, and consequent exposure to the effects of every irregular motion of this organ; 5. the continued motion which the exercise of their own functions entails upon them.

In order to appreciate the disposition of the lungs to hemorrhage still further, we shall briefly glance at the two systems of bloodvessels which traverse them, viz. the bronchial or proper nutrient vessels of the organs, and the pulmonary vessels, whose office consists in

the transmission of the blood through the lungs, for the purpose of its undergoing the proper chemical changes to fit it for its several uses.

The bronchial arteries are distributed to all parts of the lungs. Their trunks follow the course of the bronchi, and, sending off twigs to all the branches given off from the bronchial tube, accompany them to their ultimate termination. These numerous bloodvessels, after embracing the bronchi, penetrate their coats, and are spread out upon their mucous surface into an incredible multitude of capillaries. In addition to these branches supplying the bronchi, the bronchial arteries send lateral branches to all other parts of the lungs, which, passing into the tissue of the organ in connexion with numerous branches of the pulmonary artery and pulmonary vein, constitute a fine network made up of innumerable capillaries freely anastomosing with each other.

The pulmonary artery, after it has pursued the bronchi to their termination, sends branches to each vesicle; and these branches, anastomosing on all sides, are spread out upon the vesicles. This artery gives off vessels which, pursuing a tortuous course between the air-cells, proceed to take their share in the composition of that network of vessels to which we have before adverted as made up of the ultimate ramifications of the bronchial and pulmonary arteries and pulmonary vein. Through the medium of these vessels, an injection thrown into the bronchial artery fills the pulmonary artery also, though its passage from the latter into the former is much more easy.

The pulmonary veins, made up of branches collected from all points to which the bronchial and pulmonary arteries carry the blood, conduct this fluid back to the heart, pursuing their course along the bronchi and their branches in the same way as the pulmonary artery.

These anatomical details explain to us, so to speak, the machinery of pulmonary hemorrhage, and enable us to understand the mode of operation of the many and different causes which produce this morbid phenomenon. They exhibit to us such a freedom of communication existing between all the bloodvessels of the lungs, that any derangement of either the general or pulmonic circulation is competent to give rise to it. In certain excitements of the general circulation, the blood will be impelled through the bronchial artery, proceeding from the aorta, into the smaller vessels which are spread upon the bronchial mucous surface, and from them into the bronchial tubes. Should the derangement be more particularly confined to the pulmonary circulation, as in case of hypertrophy of the right ventricle of the heart, the blood will then be driven into the small branches of the pulmonary artery which are distributed to the parenchyma of the lung, and, being exhausted there, will constitute hemorrhagic engorgement or pulmonary apoplexy; and, should the impetus be considerable, its effects will be extended to the communicating bronchial branches, from whence the blood will be poured into the bronchial

tubes, giving rise to bronchial hemorrhage. See APOPLEXY PULMONARY.

We are now prepared to understand a circumstance to which we shall have occasion to advert when we come to speak more particularly on the subject of pulmonary apoplexy. Although this affection generally consists in the extravasation of blood into the parenchyma of the organ, and of hemoptysis more or less extensive at the same time; still this latter phenomenon may be altogether absent, and the hemorrhagic engorgement (which is really the essence of the disease) alone be present. In fact, we regard the addition of the hemoptysis as a mere accident, though a measure of the intensity of the cause which has given rise to the hemorrhagic engorgement; and we readily account for its frequency by the facility with which an injection is found to pass from the pulmonary into the bronchial artery. The communication which we observed to exist between the pulmonary vein and pulmonary and bronchial arteries, furnishes us with the *rationale* of hemoptysis dependent upon particular lesions affecting the left side of the heart. Thus, from a narrowing of the communication between the left auricle and ventricle, the pulmonary vein is *prevented* emptying its blood into the auricle; and as it is the channel into which the pulmonary and bronchial arteries empty their contents, the effects of its congestion are necessarily felt in these arteries. Besides, the remora of the blood in the lungs opposes a resistance to the efforts of the right ventricle to drive its blood through the pulmonary artery and lungs, and, demanding increased efforts of this ventricle, occasions its contents to be thrown with unusual force into the minuter vessels of the pulmonary artery, and the communicating minute branches of the bronchial artery: it is in this way that we explain the frequent hemoptysis in this particular lesion of the heart. From the foregoing observations it is obvious that the bloodvessels of the lungs form a circle; and that hemoptysis may result from derangement of the circulation affecting any part of it.

Though there is no period of life which can be strictly said to be exempt from hemoptysis, still it is so much more frequent from the age of fifteen to thirty-five, that this has been considered its proper season. This is the period when the energies of the system seem to converge towards the organs of respiration; and when are developed between them and distant organs those sympathies upon which their susceptibility to certain diseases would seem to depend. This is the period when phthisis strikes its victim; and when we come to speak more in detail of the particular lesions of the lungs which give rise to hemoptysis, we shall see how often it occurs as a symptom of this disease.

Hemoptysis sometimes comes on quite suddenly, and without any premonitory announcement. It is, however, in general preceded by chilliness of the skin, lassitude, alternating paleness and flushing of the face, head-ach, palpitation of the heart, and strong

vibrating pulse. To these may be added what we may term the local symptoms, consisting of a painful sensation of weight and tension, and of heat and itching in all or in some part of the chest, with dyspnoea, and a sense of anxiety about the *præcordia*: these symptoms are due to the congestion which immediately precedes the effusion of blood. Other symptoms are enumerated, which are in reality owing to the blood already effused into the parenchyma of the organ, and into the bronchial tubes. Among these the most remarkable are a sense of ebullition in the chest, (a feeling produced by the mixture of blood and air from the successive movements of inspiration and expiration,) and a great increase of dyspnoea.

When blood is effused into the air-passages, the irritation it produces causes cough, which determines its expulsion; and when the effusion is considerable, (which it is sometimes, to the degree of producing an urgent sense of suffocation,) the muscles of expiration contract almost convulsively, the lungs are compressed, and the blood is expelled with violence through the mouth and nose. Sometimes some of it, passing into the stomach, excites vomiting and is rejected with the contents of this organ; a circumstance which may embarrass our diagnosis as to the original source of the hemorrhage.

Hemoptysis varies considerably in the quantity of blood discharged. Its extent is sometimes so great that we wonder how it can take place, and not extinguish life; still we see the same quantity discharged again and again at intervals not very long distant, and this go on for months, nay for years, and the subject of it ultimately restored to the enjoyment of perfect health. At other times, we regard with alarm even the appearance of expectorated blood, when we have reason to look upon it as the index of deeper mischief latent; a single sputum tinged with blood will then bespeak more danger than a loss, frightful in quantity, under different circumstances. From this we may conclude that the extent of the hemoptysis is not in all cases an exact measure of the amount of danger; and that in general its importance is derived from the circumstances under which it takes place.

We should be acquainted with the appearances presented by expectorated blood, as a circumstance to guide our diagnosis. When it is not in considerable quantity, it is generally frothy or mixed with air, and of a vermilion or arterial colour; if it be considerable, it is not frothy, but has the arterial colour. These appearances, however, are not sufficiently constant to enable us to rest our judgment on them alone: we must have recourse to other signs and symptoms, both positive and negative, before we deliver our opinion in doubtful cases.

Among the constitutional symptoms of hemoptysis, some depend upon the actual loss of blood; others are due to the alarm or nervous shock produced by this phenomenon, which is so often associated with circumstances of

danger. In this way alone can we explain the exanguious appearance, the tremor, the hurry of the circulation, the irregular action of the heart, the fainting which we find so often to follow the loss of even a moderate quantity of expectorated blood. We constantly observe a loss of blood apparently trifling produce more disturbance in a nervous delicate person, than a very considerable loss will do in one of a strong vigorous constitution: in fact, fright and hemorrhage have precisely the same physiological operation, and give rise to the same phenomena.

Hemoptysis is the consequence either of congestion of the lungs, (whether caused by the blood thrown upon these organs with unusual force, or by its remora in them,) or of some lesion of those organs: we shall therefore consider it under these circumstances respectively.

When we reflect upon the organization of the lungs, we cannot wonder that they should often be the organ through which nature relieves herself from a state of morbid plethora; especially should that state depend upon the suppression of a hemorrhage which ordinarily takes place from an organ between which and the lungs a sympathy is known to exist. Physiology has ever recognized a remarkable sympathetic relation to exist between the organs of respiration and the uterine system; in virtue of which the lungs (especially when possessed of any particular susceptibility of disease whether natural or acquired) seldom remain long unaffected, should there be any interruption to the development or regularity of the functions of the uterus. This is the most fertile source of hemoptysis, independent of organic lesion of the lungs. In some of these cases we find the hemoptysis anticipating the period of the establishment of the menstrual discharge, and entirely ceasing when this discharge has been fully established. In other cases we find the hemoptysis altogether superseding this discharge, usurping its regular periodical appearance, and establishing itself into a function, so connected with the health of the system as to require much caution to be observed in interfering with it. Again,—and which is the most common case,—the hemoptysis is a supplementary discharge, making up for the deficiency of the menses: in these instances nature seems to make an effort to establish the due order of her functions; pains in the back and loins are felt at the same time as a sense of weight and tightness in the chest, with oppressed breathing; upon these follow a mere appearance of the menstrual discharge, and a more profuse discharge of blood from the chest. This state of things will sometimes continue till the period of life when the menses usually cease, with no more inconvenience than the occasional oppression caused by the congestion which precedes the hemoptysis. Hoffmann mentions a remarkable case in which the hemoptysis usurped the place of the menses: the subject of it became pregnant, the hemoptysis was then suspended, and reappeared after delivery, and continued for many years.

Suppression of the hemorrhoidal discharge will give rise to hemoptysis. Between this and the hemoptysis connected with suppressed menses, Laennec makes the distinction that the former occurs as pulmonary apoplexy, and the latter as bronchial hemorrhage. This hemorrhage exhibits the same tendency to return as the discharge which it has superseded. Masson (*Dissertation sur l'Hémoptysie*) records a remarkable case where the hemoptysis, which succeeded a suspended hemorrhoidal discharge, returned regularly every month for a year, although the original discharge had not observed the same periodical regularity.

Hemoptysis occurs sometimes, though rarely, as a critical discharge. Nature, in directing her critical efforts to other organs in preference to the lungs, would seem as if she respected these organs in consideration of their importance, and of the danger that might result from their being the subject of hemorrhagic congestion.

Any circumstance, which, by interrupting the balance of the circulation, throws an unusual quantity of blood upon the lungs, may act as a cause of hemoptysis. It is thus that the bent position of the body, which certain trades require, acts. Tailors are, for this reason, much subject to this affection: their constant sitting posture, with the body bent and head leaned forward, and with the abdominal viscera so compressed as to admit a less than natural quantity of blood into them, favours an unequal distribution of this fluid, which is directed in an undue proportion towards the lungs, and produces in them a local plethora, a frequent result of which is hemoptysis.

Malformation of the thorax, by compressing the lungs, and thus interfering with the free exercise of their functions, often causes hemoptysis; a fact already noticed by Morton.

Prolonged pressure upon the abdomen by tumours, whether solid, fluid, or gaseous, produces hemoptysis, by diminishing the quantity of blood sent to this region, and increasing that which is carried to the chest. In advanced pregnancy hemoptysis is sometimes so considerable as to demand instant delivery. Stoll mentions a case in which hemoptysis came on during ascites: it ceased on tapping, and reappeared on the fluid accumulating again. Tympanitis has been known to be attended with a similar result.

Hemoptysis is often caused by a paroxysm of some of the diseases classed under the head of *neuroses*. Bohn mentions a case of epilepsy, each attack of which brought on a profuse hemoptysis. We have often had occasion to observe the same in paroxysms of hysteria.

M. Fougnet, Professor at Montpellier, treated successfully with bark a tertian which was always ushered in by an hemoptysis so considerable that the patient seemed to vomit blood.

Low, asthenic fevers, accompanied with petechiæ, often exhibit this phenomenon. It was much more common in eruptive fevers before Sydenham improved the practice in this class of diseases. Haller observed, in an

epidemic small-pox, that all who were treated upon the cordial heating plan were covered with livid spots, the appearance of which was preceded by pains in the back and chest, and by hemoptysis. Diemerbroeck, in his description of the plague which ravaged Belgium and Germany in the middle of the seventeenth century, mentions the hemorrhagic flux from the nose, uterus, urinary passages, and lungs. Fracastorius makes the same observation respecting the plague of the fourteenth century.

Besides this accidental complication of fever and hemorrhage, authors admit a hemorrhagic fever, in which the fever is as essentially connected with the hemorrhage, as the fever preceding and accompanying small-pox is part of that disease. This fever may be either sthenic or asthenic in its type, and the accompanying hemorrhage either active or passive in its character. The most striking feature of sthenic hemorrhagic fever is the full, bounding, vibrating pulse, so characteristic of this morbid condition that by it alone we can almost predict an impending hemorrhage.

We have already anticipated our observations upon hemoptysis resulting from congestion of the lungs, the effect of disease of the heart, and explained its frequency in that particular lesion which consists in a narrowing of the communication between the left auricle and ventricle. The following case will illustrate this point. We had under our care, for three years, a young female who laboured under most distressing palpitation, greatly increased by the slightest exertion or motion: the phenomena of auscultation left no doubt that the lesion consisted in a narrowing of the left auriculo-ventricular opening of the heart. She had repeated hemoptysis, which became more frequent and profuse as she approached death. Examination of the body after death exhibited both lungs gorged with blood; even the minutest capillaries under the pleura were injected; and there were numerous ecchymosed patches in the cellular tissue subjacent to this membrane. The heart did not exceed the natural size; its right ventricle was both in a state of hypertrophy and dilatation; the left ventricle was smaller than natural; the capacity and muscular structure of the left auricle were unusually developed; the communication between the left auricle and ventricle would scarcely admit the introduction of a crow-quill. The pulmonary artery exceeded its natural size; the calibre of the aorta scarcely equalled that of the common carotid. This is the lesion which we shall find to be most frequently the cause of pulmonary apoplexy; a form of hemorrhage to which we shall have occasion to advert when we come to speak of the morbid conditions of the lungs which give rise to this phenomenon.

Hemoptysis arises no less from moral than from physical causes. Moral causes operate principally in the production of hemoptysis through the medium of the heart; in fact, the lungs and heart have such an intimate sympathetic relation, that one cannot be affected without involving the other; so that it is not always

easy to determine which has preceded in the order of their derangement. There is no organ in the body more subject to disturbance of its function from the irregular play of passion than the heart; and whether that passion be of the exciting or depressing character, it is equally capable of producing hemoptysis. These two orders of moral affections act upon the heart as stimulant and sedative agents do; the former throwing an unusual quantity of blood upon the lungs; the latter, by weakening the impelling power of the heart, giving rise to a stagnation of blood in them. In addition to hemoptysis proceeding from these palpable causes, we sometimes meet with it under circumstances in which we cannot fathom its etiology; when, perhaps, it depends upon some particular state of the capillaries, which our imperfect knowledge of this portion of the vascular system prevents our appreciating. One of these mysterious cases is that remarked by Dr. Cheyne in the fifth volume of the Dublin Hospital Reports: the subject of it has had, since 1807, frequent attacks of hemoptysis coming on at variable intervals, but nearer to each other in spring. We have had recent communication with this individual on the subject of his disease, and have been informed that it comes on without any provocation, and when at its height returns three or four times in the course of the day: it is not influenced either by rest or by exercise, and does not seem to yield to remedies, but subsides spontaneously. Previous to the attack a sense of constriction is felt in the chest; there is no fever, the pulse not exceeding eighty-four beats in the minute. A system of small bleedings from the arm, adopted at the suggestion of Dr. Cheyne, gave the first check to his disease, and by following it up he is now enabled to engage in the active duties of his profession as a clergyman, and feels no inconvenience from an unsparing exercise of his voice.

We now come to consider hemoptysis in connexion with actual lesion of the lungs.

Unquestionably the morbid condition of the lungs with which hemoptysis is most frequently associated, is the development of tubercles: this is a pathological fact universally admitted, though the question whether the hemoptysis, which so often ushers in phthisis pulmonalis, be the harbinger of tubercles, or the index of their actual existence in the lungs, is still *sub judice*, each opinion reckoning among its advocates the highest pathological authorities. Laennec is of opinion that the formation of tubercles precedes the hemoptysis, and that the contrary opinion is founded upon the hasty application of the axiom, *post hoc, ergo propter hoc*; that though the hemoptysis is the first symptom of the disease which attracts notice, still, if the chest be examined before its appearance, there will be evidence of the existence of tubercles; and as hemoptysis often recurs in the progress of the disease, we may conclude that the presence of tubercles is its most frequent occasional cause. He further adds that the mode of their operation

in the production of this effect is easily understood, when we consider that they are foreign bodies, which in their development press upon and irritate the parenchyma of the organ; that, on the other hand, we want a positive fact to prove that hemoptysis alone can produce tubercles; nor can we conceive, anatomically, how that can be the case; for if it were so, we should see hemorrhagic engorgement transformed into miliary tubercles, a circumstance which he had never observed. Besides, he observes, hemoptysis resulting from violence is nothing more than a mere accident, unattended by any unpleasant sequelæ if properly treated; whereas tubercular phthisis, long latent, often manifests itself immediately after an hemoptysis coming on without any appreciable cause, and which has no other cause than the presence of tubercles in the lungs.

Andral, in advocating the opinion of the hemoptysis preceding the formation of tubercles, and being their actual cause, says he has more difficulty in conceiving how tubercles, which, according to those who espouse the former opinion, have the power of irritating the pulmonary parenchyma to the degree of producing abundant hemoptysis, can exist for a long time without causing even a slight cough, than that under causes more or less appreciable some portions of the lungs should become the seat of sanguineous congestion, and give rise to hemoptysis. If this congestion exist in one or more points of the lung, and if at the same time the subject be predisposed to tubercles, these bodies may arise easily, and multiply rapidly, in the midst of a part whose nutrition is modified in consequence of the new state in which it is: it is thus that he would explain phthisical symptoms so often following hemoptysis, although well-directed treatment will often avert the mischief.

Louis thinks that hemoptysis, unless connected with irregular menstruation, or dependent upon external violence, furnishes strong presumptive evidence in favour of the existence of tubercles in the lungs; an opinion sustained by actual observation and the analogy of other organs, in which, when hemorrhage occurs, it is the index of some serious alteration in their structure: besides, it is natural to suppose that the same cause which produces hemoptysis in the progress of the disease, produced it also in the beginning.

We may infer that Broussais is of opinion that hemoptysis precedes the formation of tubercles, from his observation that the loss of blood is not to be considered the direct cause of consumption, but as one of the inflammatory movements which are the sole cause of phthisis.

Amidst these conflicting opinions, we hesitate to express a decided judgment, while we admit a bias in favour of that which considers the formation of tubercles to precede the hemoptysis. In the examination of those who have died of hemoptysis, we have found tubercles, the existence of which was not suspected during life; and we have ever regarded the mode of operation of tubercles in the lungs to

be precisely similar to that of foreign substances in other parts of the body, each tubercle or cluster of tubercles acting as a nucleus or centre of irritation, and soliciting to the part an unusual flow of blood.

In admitting the difficulty of deciding between these opposite opinions, it happens fortunately that the difference carries with it no practical inconvenience, as whichever view be adopted, it involves no difference of treatment. So frequent an accompaniment of phthisis is hemoptysis, that Louis found it to exist in two-thirds of the cases which fell under his care.

Andral observed, that among those that die of consumption, a sixth have never spit blood; three-sixths or a half never spit blood till pulmonary tubercles had given unequivocal evidence of their existence; and in the remaining two-sixths the hemoptysis seemed to precede and be the actual cause of the tubercles.

There are three principal sources from whence the blood expectorated in these cases may be derived; either from the mucous membrane of the bronchi, or from a tubercular cavity, or from the parenchyma of the lung. Death is sometimes caused by hemoptysis, when examination can detect no other source of it than the bronchial mucous membrane, which, in this case, only exhibits a slight blush, or is even paler than natural. As hemoptysis is found to be more frequent when tubercles are in their crude or nascent state, we may account for the repetition of this phenomenon by the successive development of these bodies through the course of the disease, on the physiological principle above noticed, *ubi stimulus, ibi fluxus*. We may perhaps ascribe the frequency of hemoptysis at this stage of the disease to the obstruction to the pulmonary circulation caused by the extensive tubercular development in the lungs; this obstruction demands an increased energy of the right ventricle, whereby the blood is thrown with unusual force into the lungs, and hemorrhage is thus produced. This we may expect to be most frequently the case when the tubercles have formed rapidly, and not allowed time for the heart to accommodate itself to this sudden encroachment upon the sphere of its operation; and it would be a more frequent occurrence if the strength of the heart were not weakened by this organ sharing in the muscular atrophy incidental to the disease.

The next source of hemoptysis is a tubercular excavation. In several phthisical patients who have died of hemoptysis, there have been found large excavations hollowed out in the lungs, and filled with blood either fluid or clotted: in this case the blood is also found in the bronchi and trachea, and the individual seems to have died of suffocation. It is very common to find the purulent matter contained in a cavity tinged with blood. It sometimes happens, though rarely, that the blood in these cavities is poured out from a vessel traversing their sides, in those transverse bands which Laennec has not unaptly com-

pared to the *carneæ columnæ* of the heart: these bands consist of an artery, vein, and bronchial tube matted together. The canal of the artery is generally obstructed, although an unhealthy inflammation pervading the pulmonary tissue will interrupt this provision of nature; and the arterial structure, which might almost be said to enjoy an immunity from the effects of inflammation under its ordinary circumstances, will here yield, and admit of an extravasation of blood.

The next *reputed* source of hemoptysis is the *parenchyma* of the lung. The lesion upon which this depends has, from its analogy with cerebral apoplexy, been designated pulmonary apoplexy. It is thought to depend upon a sanguineous exhalation into the pulmonary parenchyma, that is, into the air-cells, whose form is represented by the granular aspect of the surface of a section of a portion of lung affected with this modification of disease. This lesion, consisting of a circumscribed hardening of the pulmonary tissue, is considered by Laennec, who first noticed the subject, to be the frequent source of these alarming discharges of blood from the lungs which we sometimes meet with. The density of the affected portion of the lung is greater than that which constitutes hepatization. The hardened portion, different from that affected with hepatization, presents no trace of the pulmonary tissue, but is of a homogeneous aspect and of a deep black colour, resembling a clot of venous blood. Pulmonary apoplexy would seem to consist in a double lesion, viz. hemorrhagic engorgement and hemoptysis: this latter, though the most striking feature of the disease, is less essential than the other, and may be absent without changing the character of the lesion. Experience has established this fact, auscultation recognizing the engorgement which had not been announced by the ordinarily accompanying hemoptysis. Nor indeed have we much difficulty in explaining this, if we revert to the observations we made upon the freedom of communication between the pulmonary and bronchial vessels. It is found to occur most commonly from hypertrophy of the right ventricle; the effect of which lesion is to throw the blood with unusual force into the capillary vessels of the pulmonary artery. Should that force be considerable, the blood will not only pass into the bronchial capillaries, and thus into the bronchial tubes, giving rise to hemoptysis in the common form, but may lacerate not only the tissue of the lung, but also its investing membrane, and be extravasated into the cavity of the chest. We can likewise understand how the blood may be impelled with a force only sufficient to fill the capillaries of the pulmonary artery, without that force carrying it on to the bronchial capillaries; in which case we shall only have so much of the lesion as consists in the hemorrhagic engorgement without the hemoptysis; whereas, should the influence of this force extend to the bronchial capillaries, ordinary hemoptysis will be superadded. The external hemorrhage, then, we do not regard as a consequence of the hemorrhagic engorge-

ment, but as a concurrent effect of the same cause.

There is a species of pulmonary apoplexy in which the extravasated blood forms a coagulum in a cavity hollowed out in the substance of the lung. This is the only lesion which in strictness seems entitled to the designation of pulmonary apoplexy, as being that which alone is analogous to the condition of the brain in the true apoplexy of this organ. In this lesion the pulmonary tissue is lacerated by the blood issuing from its vessels, in the same way as the cerebral tissue is lacerated under similar circumstances. A case of this nature fell under our notice not very long since; the subject of it died of a profuse expectoration of putrid blood; and on examination after death a considerable quantity of blood in the same state was found in a cavity occupying the entire extent of the right lung. The attack arose from exposure to cold when the individual was in a state of intoxication.

The modification of pulmonary disease which Bayle has designated *ulcerous phthisis* (*phthisis ulcereuse*), and which is now recognized as gangrene of the lungs, from the fetor of the breath and expectoration which accompanies it, often gives rise to hemoptysis to such a degree as to cause death. Though this form of disease is sometimes, nay often, complicated with tubercular developments, the latter are not essential to it; it is, in fact, an unhealthy inflammation of the pulmonary parenchyma, which generally takes place in a bad habit of body, and in its destructive operation respects no tissue. This is the case in which nature seems to neglect her usual precautionary measure of obliterating the canal of the arteries, to provide against hemorrhage; these vessels remaining pervious, and giving way to the disorganizing ulceration, furnishes one of the few instances of hemorrhage arising from actual lesion of the containing canals. A profuse hemoptysis is often one of the first symptoms that ushers in this disease; but in general the patient for some time previously has had a pain in the side, and a teasing irritating cough, his general health much deranged, languor and lassitude, loss of appetite, &c. Amidst these symptoms he is sometimes suddenly seized with hemoptysis so extensive as to extinguish life at the moment; an instance of which is related by Bayle in the first case which he gives of this modification of disease.* In some cases the hemoptysis has the effect of relieving the system, as it were, from an oppressive load, and the patient feels himself much better after it; but fetid expectoration soon succeeds, and the hemoptysis is repeated at variable intervals, but with the same feelings of momentary relief. This state of things sometimes continues through this often protracted form of disease. Examination after death exhibits the several tissues of the lung indiscriminately involved in one general sloughy mass emitting an intolerable fetor.

* Observation 25.

Hemoptysis has no necessary connexion with pneumonia; the prune-juice sputa, however, which Andral regards as characteristic of the third stage of pneumonia, owe their colour to the blood, which is mixed with the other matter of expectoration. Bronchitis, especially when it occurs as an epidemic, is sometimes attended with abundant hemoptysis. This form of disease seems to differ much from ordinary bronchitis, and to bear some analogy to dysentery; for as this latter often degenerates into diarrhoea, so the former terminates in an analogous form of disease, consisting in a thin, frothy, abundant expectoration. When bronchitis thus occurs as an epidemic, it is accompanied with a small feeble pulse, great prostration of strength, loss of appetite, languor, lassitude, loaded tongue, and high-coloured urine, &c. It is of the last importance that we be acquainted with the form of disease, and be enabled to recognize the hemoptysis as a symptom connected with and dependent upon a serious constitutional derangement, and whose treatment merges into that of the constitutional disorder. We have known death to follow a mode of treatment which only contemplated the hemoptysis, and left out of sight the more important cause upon which it depended; this seems to be the disease which Stoll designated bilious hemoptysis, and which he treated so successfully with emetics.

Independently of organic lesion of the lungs, hemoptysis may arise from lesion of either the larynx or trachea, and is met with in persons whose profession requires a continued exercise of voice. Hemoptysis, however, from this source has been admitted more from analogy than from actual observation, and seems to rest more upon negative than upon positive evidence; more upon the absence of the signs of pulmonary hemorrhage, than upon any unequivocal proof that the blood comes from the larynx or trachea.

External injury often produces aggravated hemoptysis: thus, violence directly applied to the chest will sometimes be followed by an immediate and abundant expectoration of blood, an effect which is often attributed to an opening of some vessel produced by a fractured bone, which is sometimes one of the consequences of this violence; but as in many cases the hemoptysis comes on independently of any fractured bone, it must be ascribed to the commotion of the system produced by the violence. The assassin's poniard is the frequent source of fatal hemoptysis. Henry the Fourth of France received two strokes of a knife from the hand of the traitor Ravillac; he uttered a few words, threw up some blood, and immediately expired. Examination after death discovered two wounds: one, in the left side of the chest, did not penetrate; another, between the fifth and sixth ribs of the same side, penetrated the left lung, and made an opening to the pulmonary vein, capable of receiving the point of the little finger: the lungs were black and gorged with blood, and there was much blood effused into the cavity of the chest.

Treatment.—Having considered the important phenomenon of hemoptysis under its

different phases, and under the different circumstances both of the constitution and of the organs with which it is connected, we next come to the interesting subject of its treatment; upon which were we to enter as fully as its importance deserves, we should extend this article beyond its legitimate limits, and encroach upon other articles which have to deal with this phenomenon in the relation of a symptom of many morbid conditions both of the constitution and of the organs from whence the blood proceeds. To the several specific articles upon these morbid conditions we would refer for more detailed information upon this important subject, while our observations partake more of a general character. We have seen that hemoptysis generally occurs either in consequence of congestion of the lungs, or of lesion of these organs: what we shall have to observe upon its treatment will contemplate it under these two modifications of circumstances.

Congestion of an organ so important as the lungs must ever be regarded with alarm, and for this reason Hoffmann observes that of all morbid hemorrhages hemoptysis is that which is accompanied with most danger. Even when it is connected with suppression of some habitual discharge, and seems to make amends to the constitution for the derangement of its functions, it cannot with safety be permitted to continue, but must be met with an uncompromising hand.

The treatment of hemoptysis resolves itself into that which is to be employed during an attack, and that which is to be pursued in the intervals of the attacks, with a view to prevent their return. The character of the hemorrhage, as to its active or passive nature, is the point upon which the treatment hinges. In an attack of active hemoptysis, general bleeding, proportionate to the vascular organism and to the strength of the individual, must be employed, and leeches should be applied to the chest, or in the neighbourhood of the organ which is the usual vent of the hemorrhage upon whose suppression the hemoptysis may depend. The auxiliaries to bleeding are derivatives or counter-irritants, either internal or external. The first include purgatives, emetics, sudorifics, and diuretics; in fact, all those medicines which, exhibited internally, produce a derivation to counterbalance the original hemorrhagic movements. The external counter-irritants consist of blisters, mustard cataplasms, frictions, and rubefacients, &c. Among the internal derivatives, purgatives of the saline class hold a foremost place; while they determine to the mucous membrane of the intestinal canal, they reduce the mass of the circulating fluid. Emetics present the threefold advantage of causing a revulsion, of producing a sedative effect upon the heart, and of determining to the skin. Sudorifics and diuretics also produce a derivative effect (though in a milder degree) by their action upon organs different from that which is the source of the hemorrhage. Nitre, from its refrigerating properties, has been long regarded as a most valuable medicine in active hemorrhage: it has

been reputed to produce an actual change in the inflammatory character of the blood. Digitalis and acetate of lead powerfully co-operate to restrain the violence of the heart's action by their sedative effect upon this organ. Muriate of soda is a popular remedy for hemoptysis, and one whose efficacy we have often witnessed. Acidulated drinks are valuable adjuvants.

Much difference of opinion prevails as to the place where external counter-irritants may be applied with most advantage; some recommending the nearest point to the seat of the congestion as the fit place for their application; while others prefer a distant point, a preference to which we subscribe, both from reason and experience. The nervous agitation which generally accompanies hemorrhage suggests to us the absolute necessity of repose of both mind and body. There should be a free circulation of cool air around the patient, but not so cold as to cause constriction of the skin, and thus determine to the internal organs. The diet should be conducted upon the most rigid principle of abstinence from every thing capable of producing the least excitement of the system.

It will sometimes happen that the hemorrhage will reduce the powers of life so low that we shall be obliged to administer stimulants. The proper management of a patient under these circumstances is one of the nicest points in the practice of medicine, as we have to determine the extent to which we can safely employ stimulants without running the risk of exciting the system, and awakening the orgasm which has produced the effect which we seek to redress. In many of these cases there is no proportion between the loss of blood and the constitutional disturbance, the latter being much greater than can be accounted for by the actual hemorrhage, which is sometimes very inconsiderable: the nervous irritability of the individual can alone account for it: here we may advantageously employ antispasmodics, viz., camphor, ether, &c. to calm the flurry and agitation of the nervous system.

If the hemoptysis, *ab initio*, partake more of a passive character, we shall find our most valuable remedies to consist of the mineral acids, conserve of roses, infusion of roses acidulated with sulphuric acid, turpentine, muriated tincture of iron, &c., and sponging the chest with cold vinegar and water. To these cases much advantage is derived from blisters applied to the chest; they restore the tone of the capillary vessels, upon whose weak condition the hemoptysis depends. A free circulation of refreshing air is no less beneficial in passive than in active hemoptysis: we have known it to give an immediate check to this affection. We are not obliged to observe the same strictness in diet in this form of hemoptysis, and may gradually come to that of a more nourishing character, with a moderate use of port wine and water.

We are next to consider the treatment and management of hemoptysis in the interval of the attacks, with a view to prevent their recurrence. If we can connect the hemoptysis with

the suspension of an habitual hemorrhage, the obvious indication is to restore that hemorrhage. Should a suppression of the hemorrhoidal discharge be the cause, aloetic purgatives, and leeches applied *circa anum*, are the means to be employed. If the suspended menstrual discharge seem to be the cause of the hemoptysis, we must endeavour, though with caution and without forcing the system, to restore the due order of the functions; and with this view we try to assist the abortive efforts of nature at the ordinary period of the menstrual discharge, by determining to the uterus by means of aloetic purgatives, by leeches applied to the interior of the thighs, and by the hip-bath: but our treatment will especially consist in imparting a degree of vigour and tone to the constitution, upon a deficiency of which this derangement of function often depends. In this case chalybeate tonics furnish us with a valuable resource: sea-bathing, horse exercise, &c. also assist the object we have in view. (See AMENORRHEA, CHLOROSIS, EMMENAGOGUES.)

In some cases we meet with this morbid phenomenon in a condition of the system precisely opposite to that which we have just described, and in which we have to adopt a mode of treatment and management as opposite. In this latter instance our object is to reduce the fulness and plethora of the system by medicine and diet.

Should the cause of the hemoptysis be less obvious, the frequency of its association with phthisis, and its being so often the precursor of this fatal malady, must make us ever regard it with alarm. We before remarked that the adjustment of the question as to tubercles being the cause or consequence of hemoptysis was a matter of indifference as regarded the treatment to be adopted to combat this affection; for, as Laennec has observed, it must be met by bleeding carried to the very limits of possibility. The question, however, assumes an aspect of greater importance when we come to consider the treatment suited to the intervals of the attacks of hemoptysis: we then feel that it involves a consideration of the most vital moment, how far we can with safety pursue a depletory mode of practice, which may have the effect of indirectly generating tubercles, by producing a habit of body favourable to their development.

The formation of tubercles seems to us to be, in most cases, the result of a deteriorated constitution taking on an action *infra se*. We meet them either in persons imperfectly nourished, or in those who have been wasted by previous disease, as by long protracted fever. We have observed in phthisical patients a disposition to generate worms and vermin, even in those who, to the latest moment of their existence, bestowed the utmost pains on the cleanliness of their person. The inference we deduce from this is, that these parasitical animals, like tubercles, indicate a degeneracy of habit, or, so to speak, a descending in the scale of the animal being. These points, however, more properly belong to the articles

TUBERCLES and PHTHISIS, to which we refer for more detailed information upon them. We would only observe that the causes which call a tubercular diathesis into active operation are such as have the effect, either directly or indirectly, of debilitating the energies of the constitution; and that therefore, though hemoptysis be a complication with which we cannot tamper, but which we must meet with decision, we cannot but regret the dilemma in which we are placed by a symptom requiring a mode of treatment which we have reason to apprehend may have the effect of increasing that condition of the system which has given rise to the original disease. We would convey our opinion respecting bleeding in phthisis in the words of Laennec, who observes that as bleeding can neither prevent the development of tubercles, nor cure them when they are formed, it should not be employed in the treatment of phthisis, except with a view to subdue an inflammatory complication or acute sanguineous congestion; beyond this it is a gratuitous waste of the patient's strength, and may be superseded by medicines, which have the effect of reducing the powers of the circulation without producing permanent prostration, such as digitalis, tartar emetic, &c. We would here express our decided conviction that phthisis, of which hemoptysis is so frequent a symptom, would be treated with much more success if physicians were not continually haunted with the apprehension of exciting or keeping up inflammation; a feeling which, within due limits, should ever be present, but still when pushed too far, and acted upon too rigorously, it deprives the system of its remaining stamina, and unfits it for bearing the exhausting effects of a wasting disease. A gentleman in Scotland (Dr. Stewart), who has now ceased to be a member of the medical profession, long since ventured to deviate from the routine of practice in this disease, and pursued a mode of treatment which has had most encouraging success: the principle of this treatment was to strengthen the constitution. He argued, that when the tubercles softened and the expectoration became purulent, the treatment should be the same as that required by the formation of matter in other parts of the body, when we have no other view than that of supporting the system. To fulfil this intention he treated the disease with tonic medicines cautiously exhibited, but placed his chief reliance upon cold bathing, exercise, and nourishing diet. His plan with respect to cold bathing consisted in making the patient sponge the entire body in the morning, and the neck, chest, and shoulders at night, with tepid vinegar and water, whose temperature was reduced each day till it was quite cold: this sponging was followed by rubbing for half an hour with flannels, and then with a flesh-brush. By degrees, as the feverishness subsided, the vinegar was laid aside. This was a preparation for cold bathing, and afterwards for sea-bathing. We do not mean to affirm that tubercles do not often form in an inflammatory habit, and that bleeding is

not often required in such a habit; we only question its propriety as a preventive measure.

The slighter hemoptysis, which comes on in the progress of consumption, seldom demands constitutional bleeding: it will in general be checked by acetate of lead, nitre, digitalis, conserve of roses, acidulated drinks, &c.

When the frequency of hemoptysis in an individual not naturally predisposed to phthisis leads us to connect its cause with some obscure condition of the capillary vessels of the organ exhibiting itself in either active or passive hemorrhage, we have to treat it as an idiopathic disease, and not, as before, as a symptom whose treatment was modified by that of the disease upon which it depended. The character of the hemorrhage, whether active or passive, alone regulates our attention: we are, therefore, relieved from the caution with respect to bleeding which tied up our hands in the management of this morbid phenomenon in phthisis. It was this kind of habitual hemoptysis to which we before alluded, as deriving so much benefit from small bleedings often repeated; a practice which seems to us entitled to a decided preference over large bleedings which cannot be repeated: for the efficacy of bleeding in these cases depends not so much upon the quantity of blood drawn, as upon the revulsive effect of the operation; the opening in the vein solicits the blood to it, and so diverts it from the source of the hemoptysis. The older physicians appreciated this point of practice, and accomplished it by closing the opening during the operation. When we reflect how comparatively independent of the general circulation the capillary system is, we see reason to expect more advantage from means which have more of a local operation, as cupping, leeching the chest, &c. We shall find nothing to exercise such a salutary control over this kind of hemoptysis as change of air, adapting the temperature to the character of the discharge; if it be active, removing to a warmer climate; if passive, to a colder and more bracing. This hemorrhage is much influenced by moral causes; moral management constitutes an important part of its treatment: the writer has known it to cease immediately upon hearing agreeable news.

Pulmonary apoplexy demands full depletion. Bleeding should be carried to the extent of producing fainting; and should the hemoptysis still continue, we must adopt every other means calculated either directly or indirectly to lower the energies of the circulation. For this purpose we would employ small doses of ipecacuanha often repeated, so as to keep up a continual nausea. Purgatives are a valuable resource. Laennec has not found tartar emetic as beneficial in this form of disease as in inflammation. Astringents should not anticipate the chronic stage of the disease.

Hemoptysis dependent upon gangrene of the lungs requires a mode of treatment adapted to the vitiated constitution in which it occurs. Tonics constitute our principal remedial agents, while we seek to allay the irritation of the cough by opium, hyoseyamus, conium, &c.

When hemoptysis proceeds from the larynx or trachea, and seems to be produced by an excessive exercise of voice, the first thing required is the repose of the organ; nor, in general, is this enough; as the local affection is merely the index of constitutional relaxation, the object of the means we employ must be to restore the tone of the system by exercise, shower-baths, sulphate of quinine, &c. To this we would add sponging the throat with vinegar and water. For further information on this subject we would refer to the articles APOPLEXY PULMONARY; PHTHISIS PULMONALIS; LUNGS, GANGRENE OF THE, &c. &c.

(Robert Law.)

HEMORRHAGE, (*αιμορραγία*, from *αἷμα*, *sanguis*, and *ῥήγνυμι*, *rumpo*), loss of blood. The purpose of this article is to present a summary view of the knowledge we possess, and of the doctrines now generally received, concerning *internal hemorrhage*. The term is here employed in its most comprehensive sense, as signifying the passage of the blood beyond its natural channels—beyond or out of the vessels that are appointed to contain and convey it in the healthy living body. Under this definition it is indifferent whether the extravasated blood remains pent up within the body or not.

The epithet *internal* is however prefixed, in order to limit the subject to those forms of hemorrhage which fall within the province of the physician, and to exclude all consideration of those cases which, whether they are the result of disease, or of accidental injury, or of surgical operation, are capable of relief by mechanical expedients only. These latter cases are sometimes, though not perhaps with much propriety of language, comprised under the general title of *surgical hemorrhage*, in contradistinction to the former, which are then classed as being *medical*.

In what has been called surgical hemorrhage the blood proceeds from some large vessel, situated within the reach of the eye and the finger. The principles upon which the loss of blood in such cases is arrested or prevented are well understood; and in no part of the rapid progress of modern surgery has the union of well contrived observation with sound reasoning been productive of more admirable results. With a few remarkable exceptions, such as the protection afforded against small-pox by vaccination, or against sea-scurvy by the use of lemon-juice, there is not perhaps any single improvement in the art of healing by which so many lives are saved, and so much human suffering is relieved or averted, as by the scientific application of the ligature upon the larger bloodvessels.

That kind of hemorrhage which falls to the care of the physician is less perfectly understood, and is controllable with less certainty. It comprehends, however, a large and very formidable class of diseases. In some of these the effusion of blood is an accidental symptom only; of many it forms the principal sign or

circumstance; and there are others in which it may be considered, in reference to our united means of investigation, as constituting the whole disease.

The accidental injuries to which the animal frame is continually exposed must have furnished mankind, from the earliest times, with frequent illustrations of the striking fact that the mere loss of blood, when it exceeds a certain amount, implies also the loss of life. They who had seen their fellow-men bleed rapidly to death from external wounds would be strongly impressed with the great importance of the fluid, the removal of which from the body led to an event so appalling; and they would look with interest and alarm upon the rarer instances which might occur of bleeding from internal and unseen parts. A natural but deceptive analogy, uncorrected by pathological knowledge, would almost unavoidably lead them to this further inference, that *all* hemorrhage—hemorrhage, the source of which they could not see, as well as that the source of which they were able to examine and appreciate,—proceeded from an opening in the sides of some one (or more) considerable blood-vessel.

It is true that some hemorrhages, of which the origin is, during life, beyond our vision and means of inquiry, do result from the rupture of vessels of a certain magnitude; but it is no less true that in the greater number of instances of bleeding from the interior of the body, there is no lesion, capable of being detected by dissection, either of the veins or the arteries; but the blood is poured out by what is called exhalation, and proceeds from those ultimate ramifications of the minuter blood-vessels which constitute the capillary system.

This remarkable and important piece of knowledge was ascertained long since by Morgagni; it was more formally and completely demonstrated by Bichat; and it has been so amply illustrated by subsequent observation that it may seem to be a fact almost too trite to dwell upon. Yet, judging from the writings and language even of medical men, it does not appear to be so generally known or acknowledged as it ought to be among *them*; and among unprofessional persons the old errors upon this subject prevail almost universally. To break or burst a bloodvessel, in the most literal meaning of those words, is thought by the public, and by some at least of the profession, to be a misfortune of very common occurrence; yet relatively to the frequency of hemorrhage, it is certainly a very rare one.

Bichat explicitly propounds the doctrine that in certain hemorrhages the blood escapes from the capillary vessels by a process which, in pursuance of his example, and to avoid circumlocution, we shall call that of exhalation. He rests this opinion upon several distinct considerations, some of which are perhaps more curious than conclusive.

Thus he states that if the uterus of a female who has died during the menstrual period, be carefully examined, no erosion of its inner sur-

face or of its bloodvessels can be seen, nor any of those numerous cicatriculæ which, he argues, must have been formed, if each occurrence of the catamenial discharge had resulted from a rupture of those vessels.

The rupture which he here supposes is the simultaneous laceration of numberless capillary bloodvessels. Such laceration, if it took place, would indeed account for the discharge; and it has been assumed in explanation of some morbid hemorrhages. It is by no means certain, however, that it would give occasion, especially on a mucous surface, to visible scars. Punctures, even of the skin, made by fine needles which wound the bloodvessels, do not, we imagine, however numerous they may be, leave any such traces of their former presence.

He adds, that if we submit the same uterus to pressure, and mark closely what happens, we see minute drops of a red fluid exude from its inner surface; and if we then wipe these drops away, the membrane whence they proceeded appears to be perfectly entire.

Whatever weight this argument may possess is strengthened by the actual observation of the process of menstruation in the living uterus. Dr. James Hamilton of Edinburgh is in the habit of relating, in his lectures, the case of a patient who was once under his care, and whose complaint appeared to him so instructive upon this very point, that he sent her into the clinical wards of the infirmary, that the students might have an opportunity of witnessing it. This woman was afflicted with enlargement and complete prolapsus of the uterus. The professor describes the inverted womb as having hung down between her thighs like a quart bottle; it could not be replaced; and it was tense and hard, except during the periods of menstruation, which took place regularly. At those times it became soft and flexible, and the menstrual discharge was seen, by numbers of medical men and of students, to issue *guttatim* from the exposed surface.

As, however, the process of menstruation cannot be looked upon as a morbid process; as, in the unpregnant female, during a certain portion of her life, it is not only consistent with perfect health but actually essential to it; and as the fluid so poured out is not strictly blood; the analogical argument drawn from the preceding facts in favour of hemorrhage by exhalation, though it may afford a strong presumption, is not decisive.

But the deficiency here noticed is supplied by what is observed in those cases (rare indeed, yet well authenticated) of actual cutaneous hemorrhage, where a dew of blood appears upon some portion of the skin, is wiped away, and reappears, with no perceptible alteration of the affected surface beyond some occasional variation in its colour.

Another of the arguments advanced against the possibility of rupture or laceration in such cases is drawn from the well-known fact that the flow of blood, or of the catamenia, will sometimes continue for a few moments, then cease, and again recur; and that these alter-

nate changes may happen several times in the course of a single day; so that, upon the supposition against which Bichat is contending, the wounds of vessels must heal and re-open at every change.

This reasoning is obviously both inconclusive and erroneous. We know that the cessation of hemorrhage from a *torn* vessel may and often does result from other causes than cicatrization; that even when the vessel is of considerable size, and the laceration extensive, the bleeding may occur, and pause, and occur again, and that repeatedly, within a short space of time.

Bichat did not overlook that species of evidence by which alone, after all, the existence of hemorrhage, independent of any rupture of vessels, can be satisfactorily established. He states that he had frequently dissected the bodies of persons who had died from hemorrhage; that he had examined, according to the nature of the case, the surfaces of the bronchi, the stomach, the intestines, or the uterus; and that, although he took the precaution of washing them clean, and even of submitting them to maceration before he inspected them with a microscope, he never could detect the slightest appearance of erosion.

Numerous and conclusive observations of the same kind have been accumulated by the zealous pursuit of morbid anatomy for which the present age is so remarkable; and in this way direct proof has been obtained, not only that internal hemorrhage may take place from the surfaces of membranes by exhalation, but that this is the mode in which it most commonly happens; that the effusion of blood by any of the natural outlets of the body can seldom, excepting in the cases of aneurismal disease, be explained by the detection of a broken bloodvessel.

Where hemorrhage, for example, has occurred so profusely from the stomach or bowels that the death which ensued has been sufficiently accounted for by the mere loss of blood, the whole tract of the alimentary canal has been diligently scrutinized, and has exhibited no breach of surface, nor any perceptible alteration of texture. Sometimes its mucous membrane appears, here and there, of a red colour, and as it were charged with blood; sometimes it is pale and transparent, while the vascular network visible immediately beneath it is gorged and turgid; sometimes the whole is colourless, the same network of vessels having been completely emptied by the previous hemorrhage; and sometimes again (and this is very illustrative of the mode by which the blood has issued) vast numbers of small dark-coloured masses, like grains of fine sand, can be made to start from the surface of the membrane by slight pressure. There can be no doubt that these are minute portions of blood, which had remained and coagulated in the vessels or apertures forming the ultimate channels of the hemorrhage.

These views receive an indirect but strong support and illustration from the well-known circumstance, that certain hemorrhages are pre-

ceded and followed by an increased efflux of the fluids which belong to the surface concerned. In hemorrhages from the mucous membranes this succession of events is in some persons habitual. First there is an augmented flow of mucus alone, then of mucus tinged with blood, then of blood alone; and the hemorrhage ceases by a similar but inverse gradation towards a mucous drain, which itself at length decreases and disappears. In such cases (there being no manifest erosion or organic change) it is apparent that the blood proceeds from the same vessels or apertures, which in health pour out the natural fluids of the part—mucus, serum, or sweat. There seems no more necessity, under the action of disease, for a rupture of vessels to give exit to the blood than to give exit to these fluids. What the vessels or outlets to which we give the name of exhalents really are—how they are distributed and arranged—in what manner they are connected with the ordinary capillary circulation of red blood—or under what influences they are placed—are points concerning which we have little or no certain knowledge. We know indeed that such channels must exist, though we cannot demonstrate or see them; and that, whilst the health is entire, they do not allow the blood, as such, to pass through them.

Several kinds of hemorrhage by exhalation have been enumerated by pathologists, according to the different morbid conditions with which the efflux of blood is associated. The chief distinctions of any importance may, however, be almost all comprised within the two general classes of *idiopathic* and *symptomatic* hemorrhage.

Idiopathic hemorrhage is that which occurs without any discoverable change of texture, either in the part from which the blood proceeds, or in any other part capable of influencing the circulation in the former, by reason of some intelligible connexion of structure, or function, or mutual relation. The epistaxis of young persons affords an example of this kind of hemorrhage, to which the terms *spontaneous* and *essential* are also sometimes applied.

Symptomatic hemorrhage, on the other hand, is that which depends upon some notable organic disease. It comprehends all cases of hemorrhage by exhalation not embraced by the definition just given of idiopathic hemorrhage. It may be said to be *primary* when the organic disease upon which it depends is situated in the very part which gives issue to the blood; *secondary*, when the organic disease is situated in some other part more or less distant from the former.

We have instances of the primary species in hemorrhage from the stomach, or from the uterus, dependent upon incipient scirrhus of those organs; from the pleuræ or peritoneum, under violent inflammation; from the mucous membrane of the air-passages in intense bronchitis.

Examples of the secondary species occur in hemorrhages from the bronchial membrane in

consequence of the presence of crude tubercles in the lungs, or of organic disease of the heart; and in hemorrhages from the mucous membrane of the stomach and bowels in consequence of disease obstructing the circulation through the spleen or liver.

The proximate cause (as it is called) of idiopathic hemorrhage—or the essential condition of the facts concerned in its production—is involved in much obscurity. There appears good reason for believing that it is different in different cases. It is certain that in very many instances the hemorrhage is preceded and accompanied by an unusual accumulation of blood in the capillary vessels of the part. In the secondary species of symptomatic hemorrhage this kind of sanguine congestion is also almost always present, and is then owing to some mechanical impediment of the venous circulation. The causes of such congestion antecedent to idiopathic hemorrhage are less obvious, especially when the congestion is partial.

Since the time of Stahl and his disciples the existence of local plethora has been fully recognised as constituting a frequent element of disease. Some of the distinctions introduced by him were doubtless fanciful: it is certain, however, not only that local congestion is of common occurrence, but also that this unequal distribution of the blood in the capillary vessels may happen in several ways, and from various causes, easily distinguishable from each other. M. Andral, the most recent, and probably the most able writer on this subject, describes three different conditions under which local plethora (or, to use his own convenient though somewhat uncouth phraseology, *hyperemia*) may occur in the living body.

One of these conditions has been already adverted to, that, namely, in which the return of the blood from the capillary vessels towards the heart is impeded by some mechanical obstacle. Hyperemia of this kind may be strictly local. It may be confined to a single limb when the principal venous trunk belonging to that limb is compressed, or otherwise diminished in size. If there be disease of the liver, of such a nature as to prevent a free passage of the blood through that organ, congestion will take place in all those parts of the capillary system from which the blood is conveyed by the veins that ultimately combine to form the vena portæ. The force of gravity alone will be sufficient to induce venous congestion in parts of the body in which, under ordinary circumstances, the circulation through the veins is aided instead of being opposed by that force. If the head, for instance, be suffered to hang downwards for a certain time, we see the unequivocal signs of such congestion in the tumid condition and the purplish colour of the lips, cheeks, and eyelids. When an impediment to the free transmission of blood exists in the heart itself, a tendency to stagnation is produced, first in the venæ cavæ, then in the smaller ramifications by which these veins are fed, and at length in the general system of capillary vessels; and thus general hyperemia

from a physical cause will ensue, the parts which are the most vascular being also the most readily and the most completely gorged.

The two other forms in which local plethora or hyperemia may present itself are called respectively active or sthenic hyperemia, and passive or asthenic.

The first of these proceeds from some irritation or stimulus, either applied to the part itself, or influencing that portion of the nervous system by which the vital actions of the part are regulated.

The irregular distributions of blood which fall under this head are not always morbid. In a certain degree and for a certain time they may consist with the most perfect health. The deep flushing of the cheeks and forehead under strong mental emotion, and the general redness of the skin produced by violent exercise, are familiar illustrations of this healthy congestion of capillary vessels. A similar congestion may be produced at will upon the surface of the body by mechanical or chemical stimuli—by friction for example, or the application of heat. If these causes of the local accumulation of blood be intense in degree, or continue to be applied for a certain time, the congestion is accompanied by disturbance of the functions of the part—by pain, or by other well-known changes.

But local congestion of this active kind, and essentially morbid in its character, is of frequent occurrence in various organs of the body; and in many of these cases there is no obvious exciting cause of such an unequal distribution of the blood. We have evidence indeed, in the blush of shame or anger, and in the paleness of fear, that the capillary bloodvessels may be filled to excess, or completely emptied, by causes operating through the brain and nerves; and it seems probable that morbid congestions, which are sometimes separated from those consistent with health by shades of difference not easily discriminated, may also be occasioned through the agency of the same nervous system.

Local hyperemia of the active kind seems in many instances to form a part, or rather to be an effect, of a plethoric condition of the whole body. To understand precisely what is meant by a state of general plethora, it is necessary to remember the physiological doctrine that the whole vascular system is constantly distended beyond the size of the vessels when free from any distending force. When the arteries are in any way emptied of their contents, their diameter diminishes, and frequently they become even impervious. The general notion of plethora is that this state of distention is greater than what is ordinary or natural. It is easy to conceive that in persons who live fully, lead an inactive life, and sleep much, there should be a greater quantity of blood formed, and consequently a preternatural distention of the vessels. Fulness of habit and a florid complexion are marks of the existence of general plethora; of superfluous blood being partly expended in the formation of that substance which is the least necessary in the animal economy, namely, fat,

the capillary vessels of the face partaking of the general fulness or vascular distention present in all parts of the system. We trace the existence of general plethora also in the character of the diseases most prevalent in those who are the subjects of it, in the tendency especially which they evince to hemorrhage and to inflammation.

A state of general plethora is, however, by no means essential to the production of local congestion, which, on the contrary, is of frequent occurrence in persons who are pale, spare, and deficient in blood. Nay, a remarkable proclivity to an unequal distribution of blood in the capillaries, has been observed in those who, from accident or disease, have already lost large quantities of that fluid. The general symptoms, however, which accompany local hyperemia in these two opposite conditions of the system, undergo proportional modifications.

The simple existence of local congestion of the active kind, and independent of any mechanical impediment, is sufficient to show that the blood, after it has entered the capillary system, is no longer under the sole influence of the heart's impulse; but that its subsequent motion is mainly determined by a power of contraction belonging to the smaller bloodvessels themselves. It is upon a supposed defect of such power—a diminished tonicity of the vessels, that the doctrine of asthenic or passive hyperemia is founded.

The efficacy of the assigned cause in the production of hyperemia is perhaps less obvious here than in the cases which have just been considered. The following are some of the observed facts from which its actual operation has been presumed.

In persons enfeebled by age or by disease, the lower parts of the legs, the ankles, and insteps, and the skin which forms the surface of old scars, are often habitually purplish or violet-coloured. This cannot be owing to the mere influence of gravity, because that remains constant at all ages and in all conditions of the system. The peculiar colour, denoting a sanguine congestion of the part in which it is visible, may indeed be diminished sometimes by placing the limb in the horizontal position, whereby the weight of the blood in opposing its own return from the capillary vessels being removed, the action of the vessels themselves again suffices for its propulsion. But the congestion in these cases often disappears upon the employment of friction, or of stimulating application, which would be powerless against any mechanical obstacle in the larger veins, and which would tend to increase the afflux and accumulation of blood in active hyperemia.

In the same way the large, flabby, and livid granulations which often appear on the surface of indolent ulcers, are made to contract, and to assume a more healthy and florid hue by local stimulants, which quicken the previously languid circulation by exciting (it is supposed) the vital action of the minute bloodvessels.

There is no part of the body which affords more striking and unquestionable evidence that

blood may accumulate unequally in the smaller vessels, than the eye. The conjunctiva and sclerótica, through which, while healthy, colourless fluids alone circulate, are traversed, under various forms of disease, by innumerable vessels bearing red blood. It is notorious that in certain cases the application of any stimulant to the surface of the organ will increase the existing redness, multiply the number of visible vessels, and aggravate the disease. These are cases of active hyperemia, dependent upon irritation which is still subsisting. It is equally well known that the same vessels are liable to congestion under very opposite circumstances. They are then seen to be distended with blood, tortuous, and varicose; and the redness is browner, and less vivid than before. In this kind or stage of vascular fulness, emollient applications do harm rather than good; while strongly astringent and even highly irritant substances will often promptly dissipate the vascularity. There are, again, cases illustrative of hyperemia of the asthenic kind. The strong topical irritants restore the feeble and relaxed vessels to their natural elasticity, stimulate them to contract upon their contents, and to force onwards the blood, which they cease to admit from the arteries, and the redness disappears.

In the examples here touched upon, the asthenic character of the local congestion is denoted by the peculiar aspect of the altered parts; by the circumstances under which the congestion happens; and, above all, by the nature of the measures which conduce to its removal. The doctrine of asthenic hyperemia admits of extensive and most important application, in regard to various internal morbid conditions of the body. But any further prosecution of this part of the subject would be irrelevant to the present inquiry. The preceding observations have been made with the view of demonstrating or of rendering probable certain differences in respect to the manner in which the capillary bloodvessels may become unequally loaded, and of elucidating thereby some of the modes of hemorrhage; of showing in particular that a predisposition to hemorrhage may arise under very different conditions; that it is far from being always of one and the same character, or susceptible of relief by the same kind of treatment. The fact, then, which is beyond dispute, of the frequent pre-existence of local engorgement and distention in the capillary circulation, gives support to the hypothesis that (in certain cases at least) the issue of blood results from pressure, whereby the blood in substance is urged through passages naturally impermeable by its red particles, but now mechanically dilated in consequence of the *vis a tergo*. Although the dilatation cannot be made sensible to the eye, this seems the simplest and most obvious explanation applicable to some forms of idiopathic hemorrhage, and to the secondary species of that which is symptomatic. That blood may be thus exhaled, independently of any disease in the vessels themselves, we know from experiments made on animals, and from the ob-

servation of what sometimes occurs in the healthy human body. Boerhaave produced hemorrhage into the intestinal canal of a living dog, by placing a ligature on the vena portæ. An extreme turgescence of the whole venous system is one of the results of sudden strangulation. Dr. Yelloly accordingly found such turgescence conspicuous in the bodies of five criminals who had recently suffered death by hanging; and in two of these instances, blood in considerable quantity had exuded from, and coagulated upon, the mucous membrane of the stomach.

Hemorrhage has been ascribed also to some alteration (other than that which we may conceive to be produced by the distention of plethora) in the vessels or apertures through which the healthy exhalations are transmitted. The change is considered as being of the nature of morbid debility or relaxation. That such a state may sometimes exist is not unlikely; but as we are altogether ignorant of the natural condition of these outlets, it is difficult to reason about the alterations to which they may be liable in disease. This hypothesis derives its principal support from the occasional efficacy of astringent substances (either locally applied, or taken into the system) in checking the effusion of blood, when artificial bleeding has failed.

Another mode in which the occurrence of hemorrhage has been explained, supposes an alteration in the consistence or composition of the blood itself, which thus becomes attenuated, and capable of passing through channels or orifices that healthy blood cannot penetrate. In defence of this supposition are adduced the facts that hemorrhages are known to occur where the blood is obviously more thin, pale, and serous than common; and still more remarkably where that fluid has undergone a demonstrable change in its chemical nature, or is even visibly altered in its sensible qualities; as, for example, in certain cases of purpura and of sea-scurvy.

These hypothetical attempts to explain the processes by which hemorrhage may take place deserve, perhaps, more attention than has sometimes been paid to them. The views which they involve can scarcely be regarded as mere speculative refinements; for they often exercise a real, though perhaps an unacknowledged influence upon our practice. At any rate, if they do not, prior to experience, justify certain modes of treatment, they accord wonderfully with what experience has taught concerning the means by which hemorrhage may sometimes be stayed or prevented. In some cases we succeed by measures which tend to abate the general force of the heart and arteries and to lessen general plethora, or by diverting partial plethora and restoring the disturbed balance of the circulation, or by directly emptying the turgid capillary vessels. In other cases we rely chiefly upon expedients which we believed to have the effect of constricting the extreme vessels; styptics to the bleeding part, cold to the surface of the body, producing a sympathetic shrinking in other related

membranes; or internal medicines, which use has shown to have the property of restraining the natural exhalations when in excess. And, finally, there are cases where we seek, and not in vain, to repair the blood, to restore it to its natural condition by improvements in diet, or by food of a peculiar kind, such as the juice of lemons; and *thus* the tendency to hemorrhage is cured.

Whether the hypotheses originated from a contemplation of symptoms, or whether they were suggested by the apparent effects of remedies, may be doubted; but it is well worthy of remark how in the several cases they accord with both these classes of observed facts. Certainly hemorrhage is a prominent symptom in several morbid conditions, differing greatly from each other; and there is nothing inconsistent in sometimes attempting its explanation in one way, and sometimes in another.

One observation yet remains, in regard to this doctrine of a preceding turgescence of the minute bloodvessels; namely, that it applies not only to certain kinds of hemorrhage, but also to inflammation, of which indeed it appears to be a *constant* and necessary element. Why, in one instance, the congestion terminates in that complex and variable process, or why, in another, it is relieved by an effusion of blood, we hitherto know not; but the fact that the same condition of capillary plethora is inceptive sometimes of the one form of disease, and sometimes of the other, supplies a rational ground for the analogy which has often been traced between hemorrhage and inflammation; and, what is of no less importance, it points out also the boundaries within which that analogy should be limited.

There is a very ancient division of hemorrhage (into active and passive) drawn, not so much from the nature of supposed proximate causes, as from the assemblage of circumstances in connexion with which the efflux of blood takes place.

The distinctive characters of these two forms of hemorrhage are, in well-marked cases, sufficiently broad and decided.

Active hemorrhage occurs in persons who are young and robust, who live fully, and lead indolent lives, and are subject to the influence of those causes which tend to generate plethora. Occasionally the hemorrhage can be traced to some exciting cause, such as exposure to heat, strong mental emotion, or violent exercise. More frequently, however, it seems to be the consequence of the predisposing causes merely. It is sometimes announced by a set of symptoms expressive of what has been called the *molimen hemorrhagicum*. The patient experiences a general feeling of indisposition, with wandering and obscure pains that gradually settle in the part from which the blood is about to be discharged. A series of local symptoms, such as a sensation of weight, or of tension, or of heat and tingling, sometimes a slight degree of turgescence and redness, and a visible fulness of the larger veins, indicate the afflux of blood towards the labouring organ and the parts in its vicinity; while chilliness,

palleness, and shrinking of distant parts, and especially of the feet and hands, denote an opposite state of the circulation in *them*.

The blood commonly escapes with rapidity, is of a florid colour, proceeds from a single organ, and readily coagulates, though it seldom separates distinctly into serum and crassamentum. While it is flowing, the signs of local hyperemia diminish and disappear, warmth returns to the extremities, and the pulse regains its natural strength and frequency. The patient becomes conscious of a sensible relief, and feels stronger and more lively than before. This kind of hemorrhage is in some sort its own remedy; it ceases in virtue of the discharge of a certain quantity of blood, and it is followed by morbid consequences only when that quantity has been excessive.

Passive hemorrhage is characterized by circumstances of an exactly contrary nature. It occurs in those who are naturally feeble, or who have been debilitated by disease, fatigue, insufficient nourishment, great evacuations, or the depressing passions. It is not, in general, announced by any precursory symptoms, nor attended by any re-action. The effused blood is of a dark colour, serous, and but little disposed to coagulate; and it often is poured forth from several parts of the body at the same time. If the quantity lost be at all considerable, the natural debility of the patient is rapidly augmented; his face becomes pale, and his body loses its heat. The hemorrhage leaves him in a worse condition than that in which it found him. The flow of a certain quantity of blood is not, as in the cases of active hemorrhage, suspensive of its further effusion; frequently, indeed, passive hemorrhage resists the means opposed to it the more in proportion as it has continued longer, or been more profuse.

If every case of hemorrhage could be accurately referred to the one or the other of these forms, this distinction would be of the greatest importance and value. The truth is, however, that the majority of cases cannot be said to possess decidedly either an active or a passive character. The flow of blood is not preceded by any notable excitement or exhaustion, is not announced by any precursory symptoms, and is neither followed by any sensible improvement, nor (unless it exceed a certain limit as to quantity) by any marked debility.

May not this indefinite character of the majority of cases be accounted for by the consideration that most hemorrhages are in fact merely symptoms, and derive their character from that of the disease of which they form a part? Does it not appear that the distinction of active and passive applies chiefly to the smaller class of idiopathic hemorrhages, those that are active being allied to the active form of hyperemia, and bearing a close analogy to inflammation, both as regards the symptoms which accompany them, the description of persons in whom they principally happen, and their remarkable tendency to recur? whilst the passive belong to that condition of the body which is attended with some morbid change

in the blood; a circumstance which would of itself go far, perhaps, towards explaining their simultaneous occurrence from various organs?

However this may be, that hemorrhages are sometimes what is called active, and sometimes what is called passive, is a valuable fact, apart from all hypothesis.

And concerning these morbid effusions of blood, there are several other well-ascertained general facts, with which it imports the physician to be acquainted, but of which the limits of this work will allow of a cursory enumeration only.

In the first place, hemorrhage by exhalation, of whatever kind, takes place much more frequently and readily from some tissues of the body than from others, and most especially of all, from the mucous membranes.

Upon this important fact have arisen questions which, although not without interest in themselves, do not admit, in the present state of our knowledge, of positive solution. Has it any relation to the manner in which these membranes, and the tissues subjacent to them, are supplied with a capillary circulation? or to their laxity of attachment, which facilitates and favours the accumulation of blood therein? Again, has the density or consistence of their natural exhalations any thing to do with this disposition to hemorrhage in the mucous membranes? May we suppose that the vessels or orifices appointed to exhale mucus afford a more ready passage to the blood than those which give egress to thinner fluids—serum for example, or the cutaneous perspiration?

Hemorrhage is also liable to occur, but much more rarely, from the serous membranes; from the skin; into the cellular tissue of various parts of the body; and into the substance of the several viscera.

Another important fact in regard to these hemorrhages is, that they proceed more frequently from certain parts of the body than others, according to differences of age. Thus, in *childhood* they are most common from the membrane that lines the nasal cavities; in *youth* from the mucous membrane of the lungs and bronchi; in the *middle years* of life, and towards its decline, from the rectum, uterus, and urinary passages; and in *old age* from the bloodvessels of the brain.

There are persons (and the case is far from being an uncommon one) who are subject, during the greater part of their lives, to certain hemorrhages, which occur again and again, without any notable detriment of the general health, independently of any obvious exciting cause, and (as it would seem) from some inherent necessity of the system. Habitual hemorrhage of this kind is said to be *constitutional*: it takes place more commonly from the rectum than from any other part, although cases are recorded of its occurrence from the mucous membrane of the bladder, of the bronchi, and of the nasal cavities. Linked, in some inexplicable manner, with the original constitution of the body, this disposition to hemorrhage, as might be expected, is some-

times observed to be hereditary. It differs from ordinary hemorrhage of the active kind, by affecting, indiscriminately, those who are feeble and those who are robust, but most remarkably by its recurrence at periods more or less regular.

The celebrated Gall used strenuously to maintain the doctrine of a periodic movement in the male system analogous to that which returns monthly in the female, and marked by signs which all might observe who would take the pains to look for them. That the analogy really obtains in many points, and more distinctly in some individuals than in others, there can be no doubt. It has been incidentally noticed indeed by several writers; and Chomel has given the following clear summary of the principal features of the resemblance.

“The primary appearance of these constitutional hemorrhages is sometimes preceded by a state of general indisposition, more rarely by slight febrile disturbance, and even, according to some observers, by a sort of chlorosis analogous to that which affects young girls in whom the menstrual evacuation is delayed or suspended. The hemorrhage sometimes recurs at precisely regular intervals, and by *monthly* periods more commonly than any other; being announced, on each occasion, by the same preludes, proceeding from the same part, continuing for the same space of time, and furnishing always about the same quantity of blood. Its accidental interruption is almost uniformly the cause or the effect of some derangement of the health. It is furthermore remarkable that these habitual hemorrhages, like the catamenia, do not ordinarily occupy the whole course of life; in most individuals they do not commence before the period of adolescence or youth, and they cease altogether, or recur at distant intervals only, in declining age. When they become excessive, they also (like hemorrhage from the uterus) enter the exclusive domain of pathology.”

One of the most singular facts relating to hemorrhages is that they are, not unfrequently, vicarious or supplemental—sometimes of each other—but more often, in the female, of the menstrual discharge, between which and the constitutional hemorrhages of men there has just been shewn to be some degree of analogy. Bleedings from the bladder and from the mouth sometimes follow upon the suppression of constitutional hemorrhoids; from the lungs, stomach, or rectum, upon the suspension of the menses. These hemorrhagic deviations, as they are sometimes called, take place commonly by the same organ on each occasion, sometimes by different organs in succession. It is almost always in this supplementary manner that the rarer forms of hemorrhage occur, and those of the skin in particular.

This peculiarity in regard to hemorrhage seems calculated to throw some light upon the obscure doctrine of *revulsion*; a doctrine which, though very imperfectly understood, is of continual avail in the practice of physic.

The *symptoms* which accompany internal hemorrhage are modified by various circumstances; and the degree of certainty which they impart to the diagnosis differs much in different cases.

If the part into which the blood is directly extravasated communicates with the exterior of the body, the expulsion of some of that fluid sooner or later demonstrates the case to be one of hemorrhage. The particular symptoms will have some relation to the functions of the organ that furnishes the blood, and to the time that intervenes between its extravasation and its ultimate expulsion; and certain characters will often be derived from the parts traversed by the blood before it reaches the surface. It is even difficult sometimes to determine whether the blood proceeds from a certain organ, or from those parts that lie between it and the natural outlet by which it ultimately escapes.

The blood itself will be generally more fluid and brighter in proportion as it is effused in greater quantity, and near the surface; more in clots and darker in colour, in proportion to the length of time that it has remained within the body after its escape from its proper vessels: and this length of time may depend upon the smallness of the quantity of blood effused, and the consequent tolerance of the organs through which it may have passed; or upon the actual space traversed.

If the locus of the hemorrhage does not communicate with the external air, we are without that certainty which results from the actual spectacle of the blood. But we are then assisted by *local* signs, which spring from the pressure on, or the laceration or distention of the suffering viscus, or of the parts contiguous to it; and by *general* signs, many of which are the same whether the extravasated blood reach the exterior or not. These general signs again are modified according to several circumstances. They principally vary according to the quantity of blood poured out, and to the *rapidity* of its effusion; something also will depend upon the particular organ, and much (when the quantity is the same) upon the age and strength of the patient.

Besides the symptoms which are observable at the very time of the bleeding, there are others, of much interest, which occur more remotely. These may sometimes result from a single profuse hemorrhage, but more commonly they are owing, not so much to one large bleeding, as to a repetition of such as have scarcely any immediate perceptible influence on the system.

Some of the general symptoms,—such as paleness of the face, feebleness of the pulse, coldness of the extremities, and a tendency to syncope, which have been observed to ensue upon the eruption of the blood, have been ascribed to the alarm and sense of danger which the sight of that fluid is calculated to produce in the mind of the patient. This is probably true to a certain extent; but the ex-

planation does not apply to those cases in which the hemorrhage is strictly confined to the interior of the body, yet in which the symptoms just alluded to are often strongly marked.

For the method of treatment applicable to internal hemorrhages, the reader is referred to the several articles in which the different forms and varieties of hemorrhage are practically discussed. A very cursory notice only can here be taken of the general means which are found most effectual in restraining the actual efflux of the blood.

A preliminary question, however, of some importance, here presents itself. Is it in all cases of hemorrhage proper or safe to attempt to stop the bleeding?

Without going into detail, it may be stated as a rule that *constitutional* hemorrhages ought not to be interfered with, so long as they have no perceptible injurious influence upon the health, and proceed (as they mostly do) from parts of which the structure is not likely to be spoiled, nor the function impaired, by the passage of the blood. The most common seat of these constitutional hemorrhages is the rectum, to which the conditions just mentioned are, fortunately, both of them applicable. Epistaxis supplies a less frequent example of the same kind. When these habitual hemorrhages deviate from their usual channel, and are (as it were) transferred to some more important organ, it will generally be right, among other remedial measures, to endeavour to recal the original hemorrhage. It is very seldom that the metastasis takes place *for the better*, from a part where the bleeding is attended with danger, to one where it is comparatively harmless.

Again, it will seldom be proper to employ direct expedients for stanching the flow of blood in the small class of idiopathic and active hemorrhages, unless the quantity lost is so great as to endanger the safety of the patient. Such hemorrhages have commonly a tendency to cure themselves, by relieving the local or general plethora on which they depend.

Nor may we venture to use *direct* means for checking most of those hemorrhages which result from present inflammation.

With these exceptions, it will generally be right to arrest the effusion of blood as speedily as may be; though in some of the symptomatic hemorrhages this may even be of secondary importance.

To this end the patient is to be surrounded as much as possible with cool fresh air, and kept in a state of absolute quiet. All motion of the body, and emotion of the mind, all kinds of stimulating food or drink,—every thing in short which has a tendency to hurry the circulation, should be diligently avoided; and that position of the body should be chosen which is the least favourable to the afflux of blood towards the part affected. The horizontal posture will be proper in hemorrhage from the bowels, the uterus, or the urinary organs.

In epistaxis and in cerebral hemorrhage, the head should be raised.

Of the actual remedies used for checking the further escape of the blood, one of the most important is venesection. The objects of artificial bloodletting are, to diminish the force of the heart and arteries, to lessen general plethora, to remove local congestion, and to divert the current of the blood from the suffering organ. The method, and the amount, and the repetition of the bloodletting must of course be regulated by the circumstances of each particular case. The same objects may sometimes be effected by other modes of general depletion, and especially by the use of purgative medicines.

Next to bloodletting, astringents constitute the great resource against hemorrhage; and of these *cold* is one of the chief. It may be placed in direct contact with the bleeding surface, as when ice is swallowed to restrain hematemesis; or cold water injected into the rectum in hemorrhoids, or into the vagina in flooding from the uterus; or it may be applied to the surface of the body, as near as possible to the seat of the hemorrhage, as to the nose and forehead in epistaxis; to the epigastrium in hemorrhage from the stomach; to the lower part of the abdomen, or to the perineum, in hemorrhages from the intestines, uterus, or urinary organs. But the influence of cold in constringing the smaller vessels is not confined to the part with which it is in contact: it will stop hemorrhage by the sympathetic shrinking which it produces in distant parts. Epistaxis, for example, has often been arrested by the sudden apposition of cold water to the neck, back, or genital organs. Of its even mischievous power in this way we have continual illustration in the suppression of the catamenia by cold applied to the feet.

There is a long catalogue of medicinal substances, which are esteemed to possess more or less of a specific virtue, when taken internally, in arresting the flow of blood. Most of these are of an astringent nature, and some of them are essentially useful. The binacetate of lead enjoys in this country a higher character perhaps than any other of these substances.

Many vegetable matters, and some artificial compounds, frequently employed in internal hemorrhages, seem to owe their astringent and styptic properties to the gallic acid which enters into their composition. Such are the rhatany root, uva ursi, bistort, tormentil, the pomegranate, kino, catechu, the several preparations of gall-nuts, and the nostrum called Ruspini's styptic.

The power of arresting internal hemorrhage has also been confidently ascribed by different persons to nitre given in large doses, to the mineral acids, to the muriated tincture of iron, to alum, to the oil of turpentine, to the secale cornutum, and to various other substances; a more particular account of which may be found in other parts of this work,

under the head of the individual hemorrhages.

(*Thomas Watson.*)

HEPATITIS.—See LIVER, INFLAMMATION OF.

HEREDITARY TRANSMISSION OF DISEASE.—The cases are rare in which a disease under which the patient labours displays itself in the offspring at birth, or so recently after it, that it can be supposed to be directly transmitted. Small-pox and syphilis are the diseases most frequently referred to as furnishing examples of direct transmission. Small-pox has been discovered in infants at birth, as was proved by Mr. John Hunter, and instances of marks of this disease on still-born infants are not infrequent; but those who attend scrupulously to the niceties of language consider these as examples rather of communication by contagion than of transmission by inheritance. The same distinction, if not in any case over refined, may be drawn in cases of the communication of infantile syphilis; but as a good deal of controversy has arisen on this especial case of hereditary reception, we shall bestow a few remarks upon it.

Until the period when Mr. Hunter endeavoured to give greater precision to our ideas respecting lues, many diseases, particularly scrofula, were ascribed to a syphilitic taint. This opinion was certainly too vague, and was adopted on very insufficient evidence, or rather on no evidence at all. Since the period mentioned, there has existed an unwillingness to admit the possibility of the communication of this disease to the fœtus in utero; and the nature of any indications of it which appear soon after birth is either questioned, or the disease is supposed to have been communicated by direct contagion from ulcers existing in the genitals of the mother. Many persons have questioned the validity of these objections, and among others the late Mr. Hey of Leeds, whose accuracy will not be doubted. This gentleman relates cases of infantile syphilis which could not have occurred in the manner adverted to, the disease never having existed in the genitals of the mother, but having been communicated to the nipples whilst the breasts were drawn in a previous confinement by a person habitually employed in this way, and who had contracted it by the mouth in performing the same operation on an infected female.* The writer can add his experience to that of Mr. Hey on this point, having seen many cases of what appeared to be infantile syphilis occurring speedily after birth, though at the time of delivery the mother was entirely exempt from ulcers of the pudenda. If the identity of the disease is questioned, it may be urged that the eruption is of the characteristic copper colour, the throat is very generally affected, in some cases ulceration of the genitals exists; in short that it has all the sym-

* Medico-Chirurgical Transactions, vol. vii. part ii.

ptoms of syphilis, and is speedily remediable by mercury. A singular circumstance connected with these cases is, that they occasionally occur in infants whose parents do not labour under manifest symptoms of the disease, either at the time of generation or during pregnancy; but they are never observed in the offspring of those who have not, either one or both, more commonly both, previously laboured under it.

These two diseases, and tubercles, which have been discovered in the lungs of still-born infants, furnish perhaps the only examples of direct hereditary transmission. Other diseases, for instance deafness and blindness, are connate, and are frequently observed to occur in members of the same family; but these individuals will generally be found to have sprung from parents who did not labour under the same privation. It is true that persons born deaf or blind rarely marry, so that much opportunity is not afforded of observing how far this family peculiarity, however acquired, is transmissible; but the same fact may be adduced as an argument that it is not received by inheritance. Of one hundred and forty-eight scholars at one time on the foundation of the Deaf and Dumb Institution in London, one was of a family in which there were five deaf and dumb; one in which there were four; eleven in which there were three; and nineteen in which there were two. Of the scholars, fifty-seven were girls, and the rest boys; and none of them were the children of deaf and dumb parents. The gentleman who superintended the manufactories, and who consequently had the best opportunity of tracing the subsequent history of his scholars, stated that some of them were married and had children, all of whom were perfect in the organ of hearing. One instance occurred in which both parents had been born deaf, yet the children possessed the faculty of hearing.*

Cataract is frequently observed as a congenital disease in members of the same family; but in this case it is found not to appear in successive generations as if it were at once connate and hereditary. Hydrocephalus, too, is connate, and members of the same family are born with it; but being in the adult a rapidly fatal disease, it cannot of course be received by inheritance.

Though nature is thus sparing of the direct transmission of disease from parents to offspring, she is not equally so of morbid tendencies; and what are commonly called hereditary diseases are so merely by predisposition. That children inherit the outward bodily configuration and manifest peculiarities of one or other of their parents, is well known; and that they likewise derive from them that more hidden weakness of certain organs by which these are prone to take on diseased action, is proved by the experience of ages. The hereditary predisposition to scrofula, consumption, gout, and in-

sanity, is so essentially a part of the medical creed, that a professional man called to a case supposed to belong to any of these disorders immediately endeavours to strengthen his diagnosis by information gathered from the family history. But besides these very common examples, various other diseases, such as asthma, angina pectoris, a general hemorrhagic disposition, apoplexy, epilepsy, and various nervous disorders, blindness and deafness, not congenital, and, according to Dr. Adams, elephantiasis, are transmitted in predisposition from generation to generation. To this sufficiently formidable list, some persons are disposed to add goitre and cretinism, though this can be regarded as a mere speculative opinion; but an affection closely allied to the latter, idiocy, is unquestionably hereditary. Of this Haller presents us striking examples in two noble families, into which it had been introduced above a century before the time he wrote, and where it was still manifesting itself in some individuals of the fourth and fifth generations. Certain idiosyncrasies too, which, like idiocy, cannot be regarded as diseases, are observable in successive generations of the same family; for instance, a peculiar susceptibility to the effect of certain remedies, such as mercury and opium.

Of transmissible diseases, some have appeared in several individuals at a certain period of life, and such members of the family as have escaped at this critical period have remained exempt from the affection. All the members of the family of the *Le Comptes* saw clearly till about the age of sixteen or eighteen; at that age some of them, without any apparent cause, became dim-sighted, and grew gradually more so till total blindness ensued: such has been the case for three generations with a certain number in each race; but such as have escaped at that critical age have retained their sight through life.* In the family of Mr. Bass, at Peterborough, deafness has observed a similar course.† Hydrocephalus, the disposition to which exists in certain families, though it cannot be regarded as an hereditary disease, has often attacked individuals of the same race at the same age; and those who have then escaped have continued free from the complaint. The same observation has been made of elephantiasis, angina pectoris, and other diseases.

Like other family peculiarities, hereditary predisposition to disease may cease in one generation to appear in a subsequent one; or, though manifesting itself in each generation, it may pass to the subsequent one through an individual who has escaped it. Of this mode of transmission an extraordinary example occurs in the relation of cases of hereditary hemorrhage by Dr. Riecken.‡ These cases occurred in the principality of Birkenfeld in Oldenburg.

* Baltimore Med. and Phys. Reg. 1809.

† Adams, *ubi supra*, p. 19.

* A Treatise on the supposed hereditary properties of Diseases, by Joseph Adams, M.D. &c. p. 66.

‡ Medicinische-Chirurgische Zeitung, Nov. 1830, and Edinburgh Med. and Surg. Journal, No. 108.

The parents had never been subject to hemorrhage, and the father, Ernest P., was living in good health in his eighty-sixth year at the time of the publication of the narrative. The couple had twelve children, five sons and seven daughters, of whom three boys and one girl died of hemorrhage. Their youngest daughter, who never suffered from the disease, married a stout healthy man and had six children, four boys and two girls, of whom three boys died of hemorrhage. There is no trace of any member of the family, either on the male or female side, anterior to the children of Ernest P., being affected with the disease.

How the hemorrhagic disposition arose in the second generation of Ernest P.'s family we know not; but in certain cases the first appearance of an hereditary disease in an individual can be traced to an assignable cause. The natives of the warmer regions of the earth become affected in the colder latitudes with scrofula and consumption; and the latter disease manifests itself under such circumstances even in inferior animals, as in the monkey tribe. Certain modes of living engender gout; and elephantiasis appears to be produced by a peculiar climatorial influence.

It has never been observed that these diseases, when introduced by manifest causes, have not partaken of the property of transmission to succeeding generations. If they do indeed possess this property, (and there seems no reason at present to doubt it,) nature would appear to have instituted laws for the transmission of disease on two points, the opposite of those established regarding hereditary varieties in manifest structure. The laws in the latter case are, as illustrated in Dr. Prichard's very elaborate and ingenious work, that connate varieties are apt to appear in the progeny; but that changes produced by external causes terminate with the individual, and have no influence on his descendants.* It will have been remarked that congenital blindness and deafness, though family diseases, or apt to prevail in members of the same generation of the same family, are rarely if ever hereditary. Dr. Adams suggests that though congenital peculiarities and redundancies are hereditary, connate privations are not so, and that deafness and blindness belong to the latter class; and in this way, provided it is ascertained that connate privations do not descend to offspring, the discrepancy in the law may be reconciled. Dr. Prichard endeavours to adjust the other difference by supposing that the exciting causes of diseases act upon an existing predisposition laid by nature in the original stamina and habit of the body, and that the occurrence of a malady from their application is no proof that it is engendered by them, but that they are the mere occasion on which a congenital weakness previously hidden is rendered manifest. This view he illustrates by the example of gout; but were other instances chosen, such as those of scrofula and

consumption occurring in the natives of warm when removed to cold climates, it appears questionable whether the doctrine would be found to apply invariably; whether it would not rather be proved that a morbid peculiarity may be strictly engendered by an external cause, and being thus engendered, may be transmissible to posterity. Perhaps, too, the rule that acquired peculiarities in general are not hereditary is laid down too absolutely. The writer has in many instances observed in the case of individuals whose complexion and general appearance has been modified by residence in hot climates, that children born to them subsequently to such residence have resembled them rather in their acquired than primary mien.

It is natural to enquire whether we derive any useful inference from our knowledge of the hereditary property of certain diseases? The most important and practical inference that can be deduced is, that the descendants of those who labour under any hereditary disease should be shielded as far as possible from its exciting causes; for the predisposition is of various degrees, in some so intense that at a certain period the disease occurs by the spontaneous act of the constitution; but in others so slight, that the cooperation of noxious agents is required to render it manifest. Hence the descendants of the gouty should observe the most rigid temperance; certain climates should be selected, if possible, till a certain period of life, for those of the consumptive; the offspring of the maniacal should be guarded as much as possible from mental irritation, and from all habits of life calculated to call their inherent tendency into action; whilst a nutritious and invigorating regimen and warmth should be appropriated to those who, there is reason to think, have derived the scrofulous diathesis from their ancestors. Another practical inference which might be deduced is, the propriety of avoiding matrimonial alliances between families possessing the same hereditary taint; and, generally, of forbidding all such alliances between kindred families, for few are perhaps free from some congenital weakness or susceptibility, and, to use the phrase of the cattle-breeders, all predispositions to disease are rendered more intense in families by breeding *in and in*.

(Joseph Brown.)

HERPES, from the Greek *ἑρπεν*, to creep. *Syn.* Cytisma herpes (*Young*); Lepidosis herpes (*Good*); Neshr (*Arabic*); Zittermahl; die Flechte (*German*); Dartre (*French*); Vesicular tetter.

Herpes is an inflammatory disease of the skin, terminating in the discharge of a quantity of thin fluid sufficient to elevate the cuticle into small irregular vesicles, which appear in groups or circumscribed patches of various forms, on an inflamed base, the skin in the intervals retaining its healthy aspect. The disease, which is non-contagious, generally passes through a regular course "of increase, maturation, and decline, and terminates in

* Researches into the Physical History of Man. 2d edition, vol. ii. p. 536, et seq.

about ten, twelve, or fourteen days.* Biett and Rayer assert that it is rarely preceded by fever, and unless when it proves critical of some other disease, that it cannot be referred to any appreciable cause. Our own experience, however, accords with that of Bateman, that it is frequently preceded by considerable constitutional disorder. At first the vesicles are filled with a colourless pellucid fluid, which gradually becomes opaque and of a yellowish hue, but not purulent; after which it forms crusts, which drop off, except when ulceration occurs. The eruption is attended with tingling; sometimes with lancinating pains, as if hot needles were run into the part. In some of the forms of the disease, as the vesicles concrete and the crusts fall off in one part, fresh patches arise in the immediate vicinity, and thus the disease creeps over a considerable portion of the skin.

Herpes is distinguished from pompholyx by the vesicles appearing in groups or patches on an inflamed base; and from erysipelas, by the vesicles not being preceded by redness and tumefaction; by their distinct yet clustered character, and the state of the skin between the clusters. It is scarcely possible to confound it with eczema or impetigo, neither of which assume the purely vesicular form, nor run the same regular progress within a limited period; and both of which form thin plates or semi-pellucid crusts, from under which a thin acid fluid exudes, instead of the dry harsh scab which characterises herpes.

In Bateman's synopsis we find the various appearances of herpes constituting six distinct species; and in this view of the subject he is followed by Rayer.† Biett, on the contrary, considers every form of herpes a variety of one species, *phlyctenodes*, differing only in the seat of the eruption, or in the figure of the clusters of vesicles. Thus he regards herpes *labialis* and herpes *præputialis* as varieties of herpes *phlyctenodes*, distinguished from it only by having a determined site; while herpes *zoster*, herpes *circinnatus*, and herpes *iris*, are regarded equally as varieties, differing merely in the form of the vesicular patches. In the view which an extensive experience has led us to take of the generic disease, we feel authorized in dividing it into two distinct species, herpes *phlyctenodes* and herpes *iris*, the characteristics of which are well defined: all the other forms, generally regarded as species, will be found to be mere varieties of herpes *phlyctenodes*, however they may differ in the figure of the clusters, or in the parts on which they appear: indeed the modifications which both herpes *labialis* and herpes *præputialis* display depend on circumstances connected altogether with the parts on which they appear. Taking this view of the general disease, we are of opinion that all its forms are comprehended in the following arrangement:—

Species 1. *H. phlyctenodes*.

Var. a. *H. zoster*.

— b. *H. circinnatus*.

— c. *H. labialis*.

— d. *H. præputialis*.

— 2. *H. iris*.

Species 1. HERPES PHLYCTENODES.—This species appears in irregular agglomerated groups of small, transparent, globular vesicles, not larger than a millet-seed. It is usually preceded by one or more slight febrile attacks, accompanied by thirst, heat of stomach, and flatulence, which are not immediately relieved by the appearance of the eruption, but on the contrary are sometimes aggravated by the heat and tingling in the patches of vesicles as they continue successively to appear. The clusters rise in various parts of the body; the cheeks, the forehead, the neck, the trunk, and the extremities being indiscriminately the seat of the eruption. The vesicles differ greatly in size, but the smaller are comparatively the most numerous; and when the disease spreads extensively, the clusters are chiefly made up of small vesicles.

On the spot where each cluster appears, a sensation of heat and tingling is felt; at which time, says Biett, minute red points may be detected, very closely grouped, and over these on the following day the vesicles display themselves on an inflamed base, resisting compression, and varying in size, from that of a small millet-seed to that of a pea. We have never observed the previous state here described, although its existence is highly probable: in general we have seen the spots, which afterwards became groups of vesicles, appearing as simple red blotches, which feel rough when the finger is passed over them. Rayer states that the number of vesicles in each group varies from twelve to fifteen or more.* Several of these groups rise together, forming clusters, in which the intervening skin retains its natural colour; although within, and for a small space beyond each group, it is red. The fluid in the vesicles is at first generally colourless, but occasionally of a brownish hue; it gradually thickens, probably owing to the absorption of the watery part, and in ten or twelve hours acquires opacity and looks milky or pus-like; sometimes in the larger vesicles it appears bloody. About the fourth day the larger vesicles break and discharge their fluid; the inflamed surface acquires a dull purple hue; and while many of the smaller vesicles flatten and disappear, the larger dry and change into irregular yellow or brownish crusts, which fall off about the eighth or tenth day, although sometimes not until the fifteenth or twentieth. The skin for a considerable time retains a reddish hue, indicating the seat of the previous eruption. In this manner the successive clusters run their course.

Authors agree that the causes of herpes *phlyctenodes* are very obscure. In almost every instance which we have seen, the imme-

* Bateman's Practical Synopsis, 7th edit. p. 319.

† Traité Théorique et Pratique des Maladies de la Peau, tome i. p. 226.

* Op. cit. p. 227.

diate or exciting cause appears to be derangement of the digestive organs, accompanied by a highly irritable state of the system. It has appeared also occasionally to proceed from catarrhal or other inflammatory febrile affections, in which the eruption may be regarded as a translation of diseased action from the mucous membrane to the skin.

The continental writers have laboured to mark the symptoms which distinguish herpes *phlyctænodes* from pemphigus. In our opinion it is scarcely possible to confound them; in the one the eruption consists of distinct solitary bullæ, in the other of clusters of vesicles upon isolated surfaces.

With respect to the treatment of herpes *phlyctænodes*, as this differs little from that which is requisite in the varieties, the notice of it may be deferred until these shall have been described.

Var. *a. Herpes zoster (shingles)* differs from herpes *phlyctænodes* chiefly in the size of the vesicles forming the groups, in the seat of the disease, and the manner in which the clusters successively appear and extend over the body. The vesicles, however closely agglomerated, are from the first distinct: they generally enlarge in twenty-four hours to the size of pearls; are perfectly transparent and filled with a limpid fluid: the inflamed base of the pustules, which are considerably larger and more irregular than those of herpes *phlyctænodes*, extends some distance beyond the vesicles. The most frequent seat of this variety is the trunk of the body, and as the patches of vesicles successively appear, they extend either round the waist in an oblique direction like a sword belt, or across the shoulders, or from the shoulder they extend to the arms, or from the nates down the thighs, in an oblique direction to the knee. A perpendicular position of the clusters is very rare: Rayer mentions having seen it on the thigh: he also describes a case in which it extended from the face into the mouth. "La moitié gauche de la langue est tuméfiée, épaisse, rouge, et couverte de plaques blanches, molles, irrégulières. Les unes ont les volumes des vésicules de la peau, les autres se rapprochent des bulles par leur grande dimension. L'épaisseur de ces plaques est égale à celle d'une feuille de papier, &c. La salive, secrétée en abondance, est filante; l'haléine est fétide, mais n'a point l'odeur particulière qui s'exhale de la bouche chez les personnes qui ont abusé des préparations mercurielles."* The most frequent seat of the clusters is the lower part of the thorax: the right side is more frequently attacked than the left: the eruption never appears on both sides at the same time.

Rayer has placed this variety among the bullæ, although he regards it as holding an intermediate place between bullæ and vesicular inflammation.† The eruption of shingles ap-

pears to be an affection solely of the reticular web of the cuticle, and never extends, like erysipelas, to the subcutaneous cellular tissue.

The premonitory symptoms in shingles are languor, loss of appetite, febrile rigors, headache, a quickened but small pulse, sometimes sickness, pains darting across the chest and epigastrium, and a sensation of scalding heat or deep-seated pain in the spot where the first patches of eruption are likely to appear. In old persons, and in those of delicate habits, this feeling of local heat and pain often continues for a week or more previous to the appearance of the eruption, by the coming out of which it is almost instantly relieved. It is sometimes so severe, that it has been mistaken for pleurisy, and treated by venesection and other depletory means. At other times the precursory fever is so slight, that the first notice which the patient receives of the presence of the disease is a sensation of heat and tingling on some part of the trunk, where he finds on examination patches of shining, pearly, or silvery vesicles already formed. Sometimes the patches appear at the opposite extremities of the zone, and join by the successive patches extending towards the centre. The vesicles in the separate clusters attain their greatest size, which seldom exceeds that of a pea, in three or four days; and at this time the inflammation of the base of the patch is at its height, of a vivid redness, becoming fainter as it extends beyond the limits of the cluster of vesicles. Generally before the fourth day, while the new clusters begin to appear, the lymph in the first set of vesicles becomes opaque, acquires a milky or yellowish hue, and approaches in some instances almost to the state of pus. The inflammation of the base now changes to a bluish or livid hue, and the vesicles flatten or subside: some, however, break, and either spontaneously or from friction, discharge their fluid, which concretes in dark-coloured scabs. These crusts harden and adhere firmly for ten or twelve days and then fall off, leaving the skin red and tender; and when the vesicles have been rubbed and become ulcerated, cicatrices or pits sometimes remain. These symptoms vary according to circumstances; thus in old people, or those enfeebled by want, the vesicles enlarge almost into bullæ, break soon, and almost always ulcerate; and even, according to Bielt, occasionally have been followed by gangrene. Yet the same physician has never seen the disease attended with much fever or general derangement of the system.

The febrile symptoms which we have observed, generally subsided when the eruption was complete, but not always; and we have seen cases in which the uncomfortable feelings seemed rather augmented than diminished during the whole progress of the eruption; and more especially the deep-seated pain described by Bateman, which, he says, "continues to the latter stages of the disease, and is not easily allayed by anodynes."

Shingles is not a contagious disease, and may occur several times in the same individual. In the greater number of instances it appears

* Traité des Maladies de la Peau, tome i. p. 230.

† Cette maladie forme réellement l'anneau intermédiaire entre les inflammations bulleuses et les inflammations vésiculeuses. Tome i. p. 202.

towards the termination of some acute disease. It occurs most frequently in persons between twelve and twenty-five years of age, although occasionally the aged suffer severely from it. Those who have a delicate and irritable skin are most liable to its attacks. It prevails more in summer and autumn than in spring and winter.

It is scarcely possible to mistake shingles for any other vesicular disease, unless in its early stage, when it resembles in some degree herpes *phlyctanodes*; but it may be distinguished by the appearance of the red patches on which new clusters of vesicles are about to appear. The absence of swelling of the skin, and of the disappearance of redness on pressure, readily distinguish it from erysipelas.

The general treatment of shingles is the same as that of the other varieties of herpes *phlyctanodes*, and therefore need not be detailed here. With respect to local applications, a gently stimulant spirituous lotion to the inflamed clusters, to which a portion of tincture of opium may be added when the pain and irritation are severe, may be employed. By these means the vesicles are prevented from breaking; but when this occurs, nothing is so serviceable as the oxide of zinc ointment.

Var. *b. Herpes circinnatus. Ringworm.*—This variety of herpes *phlyctanodes* is of very frequent occurrence; and being unaccompanied with any constitutional affection, is of little moment. The vesicles are small, and form in a circle, inclosing a portion of the skin seemingly unaffected, while a red inflammatory blush extends to some distance around the cuticle of the circle of vesicles. The fluid contained in the vesicles is generally discharged in a few days; after which dark prominent crusts congregate over them; and at this time the centre, which seemed free from disease, becomes rough and exfoliates.

The eruption of the vesicles is preceded by a red spot of various sizes, from half an inch to two inches in diameter: it is generally circular, but occasionally oval. In a very short time after the redness appears, the vesicles, minute and globular, can be traced by the aid of a glass, filled with a transparent fluid, which becomes opaque before they burst. Sometimes the fluid is absorbed; in which case the vesicles shrink and exfoliate almost imperceptibly. The period in which each circle runs its course is from eight to ten days; but the circles appear in succession, and as each requires a period of eight or ten days to be perfected and desquamate, the disease is thus protracted to two or three weeks or longer. When the crusts fall off, they leave a redness which remains for some time; but no other inconvenience attends the eruption. In some instances, instead of the regular circle, the whole central spot is covered with minute vesicles, which enlarge sometimes to a considerable size, and are accompanied with much heat, pain, and irritation. When this form of disease occurs, the clusters rapidly spread and pass over the great part of the arms, the places on which this variety generally shews

itself. The feverish state does not at once abate after the eruption appears: it continues to increase for five or six days; and about the ninth day the vesicles break, and the fever suddenly ceases.

The vesicular circles most commonly appear on the arms, the shoulders, the chest, the neck, and the face; and in young girls of a delicate frame of body, with a thin and irritable skin, the circles frequently display themselves on the chin.

The disease is very frequent among children, and is commonly but erroneously supposed to be contagious. Its exciting causes are obscure; and it is ushered in merely by a sensation of slight tingling and itching.

This variety of herpes, if it appear on the forehead and at the roots of the hair, may be mistaken for porrigo *scutulata*; but the vesicular character of the eruption, the regular course which it runs, and the hair not falling off, very easily enable us to distinguish it from the contagious ringworm of the scalp, as porrigo *scutulata* is termed.

No internal treatment is required: lotions containing either of the mineral alkalies, or sulphate of zinc, or alum, may be applied with advantage. Black writing-ink is a domestic application which has proved as beneficial as any that has been suggested.

Var. *c. Herpes labialis. Herpes of the lips.*—This variety differs only in the situation which it occupies. It sometimes extends round the whole mouth, sometimes its seat is the upper, sometimes only the lower lip. When it does not surround the mouth, it is not unusually confined to the angles: wherever it appears it rarely attacks the true lips, but frequently impinges upon the line of union between these and the skin, and at the same time patches of the eruption rise on the cheeks and alæ of the nose. The vesicles, like those of the other varieties, at first contain a transparent lymph, which in twenty-four hours assumes a purulent aspect, and in three or four days becomes more yellow than that usually found in pustules, few crusts forming. The lips, as the disease advances, swell, become hard, sore, stiff, and painful, with a sensation of great heat in the affected parts. After the crusts fall, the surface remains red, harsh, and painful; cracking every time the patient laughs or opens the mouth wider than usual.

Herpes labialis is more decidedly the sequel of a distinct febrile state of the system than any of the other varieties. This febrile state is often of a catarrhal kind, and not unfrequently results from sudden alternations of heat and cold, particularly sudden exposure to damp cold air, after having been confined in a hot or crowded room. The febrile affection is manifested by rigors, headach, pains in the limbs, anorexia, lassitude, and languor. This variety of herpes is often a critical eruption, appearing on the decline of acute diseases, which rapidly disappear as soon as the vesicles, or the inflamed bases on which they rise, shew themselves. Severe catarrhs often terminate in this manner; and the appearance of this vesicular disease is

considered a favourable symptom in affections of the bowels, and in the latter stages of remittent and low malignant fevers. It occasionally becomes chronic.

In general this variety requires no particular treatment; successive crops of the eruption rarely appearing, so that it runs its course in three or four days, and spontaneously disappears. To allay the heat and itching, diluted alcohol or a solution of zinc proves serviceable. When it becomes chronic, (and in this state it is almost always symptomatic of some deranged state of the digestive organs,) the hydrargyrum cum creta, combined with James's powder in the proportion of ten grains of the former and four of the latter, may be administered every night at bed-time; and during the day the liquor potassæ, in full doses, taken in the decoction of the root of the *rumex acutus* or *obtusifolius*, rarely fails in affording relief. The decoction should be made at first with not more than an ounce of the sliced root to a quart of water, and reduced by boiling to a third; but if the disease do not soon yield, double this strength will be required. The diet should be light, and consist chiefly of milk and farinaceous matters. The diluted ointment of nitrate of mercury is the best topical application in this chronic form of herpes labialis.

Var. d. Herpes præputialis. Herpes of the prepuce.—Although this variety of herpes is not uncommon, yet until Dr. Willan pointed it out as an herpetic eruption, and Bateman accurately described it, it was often confounded with syphilis and treated as such. It more nearly resembles the last variety, herpes labialis, than any of the others. It appears on both the external and internal surface of the prepuce, and not unfrequently on the glans penis. The eruption of vesicles is preceded by a teasing itching and tingling in the prepuce, which appears slightly swollen and inflamed, and covered with two or three red patches, on which, when closely examined, minute vesicles may be observed rising nearly in a circle. These rapidly increase in size; the lymph loses its transparency and assumes a milky hue; and in another day they are coherent and almost pustular. If the vesicles be not disturbed, they sometimes do not break, but the lymph is absorbed, and the shrunk vesicles desquamate; but at other times they break, and form ulcers covered with a whitish fur, and having an elevated base, not unlike the aspect which chancre assumes; and when they are rubbed, or improperly managed by caustic or acrid applications, a tedious state of ulceration sometimes supervenes. When the vesicular patches are situated on the internal surface of the prepuce and on the glans penis, the inflammation is more severe than when the exterior of the organ is the seat of the disease. In some instances the itching and tingling which accompany the eruption are so severe as to prevent sleep. On the exterior, the vesicles terminate about the fifth or sixth day, forming small, hard, acuminate scabs, under which the healing process is carried on; and about the ninth or tenth day the scabs fall and leave

the surface slightly indented. In many instances the disease does not run this regular course, but yields to very simple means in forty-eight hours.

This variety of herpes is rarely observed in young men; on the contrary, persons in the decline of life are most subject to it, and it not unfrequently accompanies stricture of the urethra, or an irritable state of this canal. It is also sometimes produced by an acrid state of the secretion at the root of the glans; and we have seen its approach checked by keeping the part between the glans and the prepuce clean with soap and hot water, and afterwards introducing a small piece of clean dry lint to absorb the acrid fluid. Dr. Bateman properly rejects the idea of Mr. Pearson, that it is caused by mercury. The most severe case of the disease which we have seen occurred in a gentleman who had never taken mercury. We cannot, however, agree with the opinion that it is altogether independent of stricture, or at least of irritable urethra: we think that we have also observed it sympathizing with derangements of the chylopoietic viscera. It is more liable to recur than any of the other forms of herpes.

As all these different descriptions of herpetic eruptions are mere varieties of one genus, the general treatment required is nearly the same in all; and this is regulated chiefly by the nature and degree of the fever which precedes and accompanies the eruption. This is seldom so severe as to require the use of the lancet, unless the patient labours under some acute disease of which the herpetic affection may be regarded as symptomatic. More frequently herpes about the mouth and occasionally on the ears occurs as a salutary crisis of fevers, and ought not to be interfered with. If the digestive organs be much deranged, and the eruption can be traced to that source, an emetic will prove useful in clearing away the superabounding acid which generally prevails, and is undoubtedly one cause of the irritation of the intestinal membrane with which the skin sympathizes.

No class of medicines so effectually fulfil the indication to be answered in herpes as mild purgatives, especially those containing magnesia, as they carry off a large portion of the existing acid, whilst the magnesia allays the morbid irritability of the gastric surface. Neither calomel nor any of the very active cathartics are in general required. Diaphoretics are not indicated; and even when much heat of skin exists, more advantage is derived from the free use of diluents than from antimonials or any medicines of that class.

One of the most distressing symptoms in severe cases of shingles is the deep-seated pain which often occurs about the thorax, and when the pulse is at the same time quick and hard, it has, as already stated, led to the supposition that pleurisy is present. The lancet brings no relief in this case; but much comfort is afforded, and sleep secured, by a combination of colchicum, magnesia, and an opiate. The

following form is that which we have found most serviceable :

R Magnesiæ ʒi.
Vini colchici seminum m xlviij.
Tincturæ opii m xxx.
Misturæ camphoræ fʒxi. M.

Sit haustus horā somni sumendus.

In the chronic state of herpes *labialis* the treatment we have already described is commonly successful; but when the disease is obstinate, it is necessary to place the patient under a course of hydrargyrum cum creta, with decoction of sarsaparilla or of elm bark. Upon the whole, although we cannot refuse to accord with the opinions of most writers on affections of the skin, that herpes requires less of the medici diligentia than almost any other of the numerous list of cutaneous eruptions, yet the young practitioner will feel frequent disappointments if he expects all cases of herpes to run so favourable a course. It is only when they are critical of some acute disease that he may altogether disregard them: on the contrary he will sometimes find the most acute suffering precede the eruption, and a degree of general derangement of the system often so obscure as to complicate and restrain the efforts of the physician. In such cases the first object is to gain an accurate knowledge of the state of the stomach and bowels, that of the liver and the chest; and if the nervous system, which is often the case, be involved in the general derangement, to ascertain how far this depends on mental causes, as many cases of herpes, in all its varieties, may be clearly traced to grief, anxiety, and other mental sources.

Species 2. HERPES IRIS.—This species differs materially in all its characteristics from the former. It was first announced as a herpetic affection by Dr. Willan, and afterwards accurately described by Bateman. Its usual seat is on the back of the hands; but it has appeared on all parts of the body; most commonly, however, where there is little fleshy substance. It first displays itself in small red spots, which, as they change colour, are surrounded by fresh circles of inflammation, which become vesicular. The patches gradually extend until they attain the size of a shilling, the circumference assuming a radiated or star-like appearance. In the description of Bateman we are told that the first circle, surrounding the central vesicle which is yellowish, “is of a dark or brownish red colour; the second is nearly of the same colour as the centre; the third, which is narrower than the rest, is of a dark red colour; the fourth and outer ring, or areola, does not appear until the seventh, eighth, or ninth day, and is of a light red hue, which is gradually lost in the ordinary colour of the skin.”* The variously coloured rings so well defined in this description are, however, rarely observed.

This species of herpes most frequently appears in children and fair women; but neither the predisposing nor the exciting causes are very obvious. Like some of the varieties of

herpes *phlyctænodes*, it has occasionally occurred as a critical eruption. In some individuals, according to Bateman, it has recurred several times, “occupying the same parts, and going through its course in the same periods of time.”

It is scarcely possible to confound herpes *iris* with any other disease. There is one species of roseola which extends in successive circles, but it wants the vesicles, which are sufficient to characterize the herpetic disease.

With regard to the treatment of this species of herpes little requires to be said: no internal medicines are required; nor do we know any local applications likely to prove serviceable in shortening the disease. The warm bath employed only for twenty minutes, and exercise taken immediately after it, has appeared to be useful. Rayer recommends decoctions of linseed to be employed as fomentations: we have had no experience of their use, so that we are not authorised to give an opinion on the subject. Moderate bloodletting, gentle aperient medicines, and a combination of the solution of arsenic and of pure potassa, with the decoction of the *rumex obtusifolius*, have been productive of more benefit than any other means which we have employed. A small piece of soap-plaster laid over the parts affected, has occasionally been productive of much benefit.

(A. T. Thomson.)

HICCUP.—Hiccup or hickup, sometimes written hiccough, apparently from a mistaken notion of the etymology of the word. It may have been immediately derived to us from the Danish; but its origin in that as well as in some other languages was most probably an attempt to imitate the peculiar sound which it denotes. It corresponds with the French *hoquet*, and the German *schlucken*; but the Greek *λῆξις* or *λῆγμῆς*, and the Latin *singultus*, though applied to this affection, seem also to have designated the somewhat analogous one which we call *sobbing*.

The phenomena of hiccup, as observed by a by-stander, may be described to consist in a sudden, rapid, and brief inspiration (such as may properly be called convulsive), instantly followed by expiration: each of these movements being accompanied by a noise not heard in common respiration, and these noises following each other in quick succession, produce that peculiar dissyllabic sound by which the affection is characterized. The convulsive movements return at short intervals, commonly varying from half a minute to a minute, but sometimes of longer duration, and are attended by an uneasy sensation at the præcordia, which, when the hiccup is violent and often repeated, amounts even to pain.

Such are the phenomena presented by this affection, apart from any attempt to explain its *mechanism*. What this is has been the subject of much conjecture. The oldest opinion seems to have been that it consisted in a convulsive movement of the stomach; an opinion which,

* Bateman's Synopsis, p. 340.

in the then very imperfect state of physiology, was not an unnatural inference from the well-known fact that the exciting cause is commonly some impression directly made upon that organ. Since, however, the functions of the stomach and neighbouring parts have been more accurately investigated, most authors have concurred in referring the motions which constitute hiccup chiefly to the muscles employed in respiration, and particularly to the diaphragm. That causes acting upon the stomach are adequate to excite these muscles to violent and irregular contractions is familiarly known. Fits of coughing (especially in the whooping-cough) and of spasmodic asthma are often produced in this way; and whatever difference of opinion may still exist as to the particular combination of muscular actions by which vomiting is effected, it can scarcely be doubtful, especially since the experiments of Majendie, that the expulsion of the contents of the stomach is ordinarily in great measure produced by the agency of some of the respiratory muscles. If, however, two phenomena, so widely differing in their results as vomiting and hiccup, are referred chiefly to the same mechanical powers, some other cause of their difference must exist. It is probably owing to an inverted action of the muscular fibres of the stomach and gullet co-operating with the other agents in the former, and not in the latter, that the rejection of the contents of the stomach takes place in the one, but does not happen in the other.

The modern opinion, which ascribes hiccup chiefly to the respiratory muscles, rests upon the following among other arguments.—1. The phenomena of the affection, as above described, appear to consist chiefly in a convulsive act of respiration. 2. The researches of physiologists have clearly shewn that the muscles in question, or at least some of them, are capable of movements corresponding with those of hiccup in rapidity and violence. 3. We are without any satisfactory evidence that such motions are ever performed by the muscular fibres of the stomach. 4. A consideration of two popular methods of preventing the recurrence of hiccup, namely, holding in the breath for a considerable time, and making a protracted deglutition by sipping liquids; both of which seem to owe their efficacy to the power of the will over the respiratory muscles.

Some writers, while they admit the agency of the diaphragm in producing hiccup, have supposed the œsophagus to co-operate with it. Thus Mahon (*Encyclopédie Méthodique*) explains the affection as consisting in “a convulsive movement of the œsophagus, which draws the stomach and diaphragm upwards, whilst at the same time the diaphragm itself experiences a convulsion which draws it downwards.”* It is, however, very questionable whether the œsophagus ever executes movements of the kind here supposed. With regard to the peculiar

noise which accompanies hiccup, there can be little doubt that it is caused by a convulsive or spasmodic action of the muscles about the glottis.

There are two convulsive affections which, without being absolutely identical with ordinary hiccup, so nearly resemble it, that they are designated by the same word, at least in some languages, and must apparently be referred to nearly the same muscular powers. Thus, what is properly called the *hiccup of death*, although owing its name to a similarity to the true hiccup, in some respects differs from it. According to Double, it consists of two quick and forcible inspirations preceding a feeble and protracted expiration. The affection which we call *sobbing* is so analogous to hiccup, that, as has been before observed, the Greeks and Romans designated both by the same words. Indeed, not only do they nearly resemble one another, but sobbing in children often passes into perfect hiccup.

Having considered the mechanism of the affection, we may next advert to its *causes*, and the circumstances under which it occurs. In relation to these points, all the cases which are met with may be referred to two general heads, according as the hiccup is or is not preceded or accompanied by some other recognized morbid affection, of which it may be considered a symptom or consequence. It will be convenient to designate these two divisions by the terms symptomatic and idiopathic, although the strict propriety of such words is questionable.

By far the most frequent cause of *idiopathic hiccup* is some impression directly made upon the stomach; as, for example, by very hot or highly seasoned food, especially in a liquid form; by alcoholic and other stimulant liquors; and by food swallowed hastily, or in too great quantity, especially after long fasting. As the affection, when produced by causes of this kind, generally occurs almost immediately after the irritating matter is taken into the stomach, it may be reasonably inferred that the impression upon that organ, which calls forth the muscular efforts by which the hiccup is effected, is chiefly made upon its cardiac extremity; and we shall hereafter see that one mode of explaining the final cause of the affection is by a deduction from this opinion.

The occasional causes just enumerated evidently act upon the sensibility of the lining membrane of the stomach; but there are others which seem to operate by a mechanical impulse communicated to the whole organ. Thus, in children more particularly, any vehement or convulsive movement of the respiratory muscles, as violent crying and sobbing, or a fit of coughing, is apt to end in hiccup. The same occasionally happens with vomiting, as was observed by Hippocrates, who noted it as an unfavourable occurrence.

A cause of a very different description from the above is fasting. It implies a prolonged absence of the proper and accustomed stimulus of the stomach; and the influence of this negative impression seems to afford a more probable explanation of the occurrence than the hypothesis

* Un mouvement convulsif de l'œsophage, qui tire en haut l'estomac et le diaphragme, tandis qu'en même tems le diaphragme lui-même éprouve une convulsion qui le tire en bas.”

which has referred it to the supposed irritation of the gastric juice.

Idiopathic hiccup, though generally, is by no means exclusively produced by causes directly influencing the stomach. Emotions of the mind, copious evacuations, as bleeding and purging; cold applied to the surface of the body, as the epigastrium, feet, &c.; and in fact, where there is a predisposition to it, almost any impression, external or internal, may call it forth. John Hunter observes that it often accompanies local irritation after operations of various kinds. To inquire whether such causes determine the muscular movements by which hiccup is effected, through the medium of an intervening impression upon the stomach, would be a fruitless indulgence in speculation.

The tendency of occasional causes, of whatever kind, to induce this affection, is of course very much dependent upon the degree of predisposition in the individual. This may perhaps be stated in general terms to arise from the same circumstances as those which appear to favour the occurrence of other convulsive movements, and especially from that condition of the system which is expressed by the common but indefinite terms of debility and irritability, or mobility. Thus it is familiar that childhood and old age are more liable to the affection than the middle periods of life; and that the female sex, especially in the puerperal state, is more subject to it than the male. There seems, however, to be ground for a more definite view of the matter, and for referring the predisposition, at least in a majority of cases, to a preternatural sensibility of the stomach, or to a tendency in that organ to functional derangement. Such a condition or tendency is well known to exist in the earlier and later periods of life, and during gestation; and it is probably owing to its presence in an unusual degree that, in some individuals, even a moderate quantity of the mildest food will often cause a fit of hiccup. Indeed in such persons it not unfrequently occurs without the intervention of any known cause.

The predisposition, in whatever it consists, may be either original or acquired. In the latter case it can sometimes be traced to debilitating circumstances, as excessive evacuations; but it is much more commonly attributable to causes which directly impair the digestive powers, as the abuse of ardent spirits, excesses in diet, &c.; and such an impaired state of the function of digestion is probably one principal cause of the peculiar liability of old people.

Idiopathic hiccup is commonly too slight and transient an affection to merit the name of disease. Sometimes, however, by its violence, but more often by its duration, it assumes a graver character, and has even appeared to be fatal, as will be more particularly stated when the terminations of the affection come to be considered. It has occasionally been observed to recur periodically, at regular intervals, as, for example, annually, and at the same period of the year. Thus Heberden speaks of cases, some of them unaccompanied by any other appreciable morbid affection, in which it lasted

for many months, and even for years, being in some constant, in others intermitting. Dr. Good also refers to cases in which it returned at irregular intervals, for periods of from four to twenty-four years; and in others in which it continued incessant, or nearly so, for eight and twelve days, and even three months.

The second division of cases of hiccup includes those in which it co-exists with, and appears to depend on, some other disease as its cause; being then what we call a *symptomatic* affection. It has been noted by authors as occurring principally in the following diseases:—fevers, both continued and intermitting, especially the latter; a complication which seems to have been formerly not uncommon, as the epithet *singultuosa* was applied to fevers accompanied by hiccup throughout their course; inflammation of the stomach, bowels, and liver; peritonitis, perhaps more particularly when the peritoneal coat of the diaphragm is involved; strangulated hernia; irritation of the mucous membrane of the alimentary canal, including worms, dentition, and the operation of poisons; disorders of the digestive function generally, especially when attended by the acid eructations which cause heart-burn; jaundice; uterine irritation, whether connected with gestation or not. Thus severe and protracted hiccup has been sometimes observed as one of the attendants of hysteria. It is also enumerated by some authors among the symptoms of inflammation of the spinal cord or its membranes; and Heberden states that it sometimes accompanies paralysis, and precedes epileptic fits. Of more uncommon instances, one deserves to be mentioned, because the hiccup is said to have been fatal. It is a case related by Bobe-Moreau, and cited by De Lens (*Art. Hoquet, Dict. des Sc. Méd.*) in which a severe hiccup accompanied an abscess in the upper part of the pharynx; and the death of the patient is ascribed to the symptomatic rather than to the primary affection. Some accidents affecting the diaphragm and neighbouring parts are also stated to be more or less commonly followed by hiccup: such are penetrating wounds of the abdomen, the passage of any of the abdominal viscera through the diaphragm into the thorax, fracture of the ribs, and depression of the ensiform cartilage.

As the most frequent cause of idiopathic hiccup is some direct irritation of the gastric mucous membrane, so by far the most common morbid affection on which the symptomatic variety depends, is functional or organic derangement of the stomach, and of those organs which are associated with it in the digestive process; a derangement of which habitual excess, particularly in the use of ardent spirits, is undoubtedly the principal origin. With regard to the mode in which the other diseases and accidents above enumerated give rise to hiccup, we seem to have no adequate data upon which to reason, and mere speculation would be worse than useless. It will, however, be seen that most of them either directly involve the digestive organs, or others which are known to have a close sympathy with them. The occur-

rence of hiccup in some of these cases can scarcely be accounted for except by supposing a considerable predisposition to exist; and the same may be said of its appearance under certain circumstances in which it is not strictly referable either to the symptomatic or idiopathic form, but immediately follows the disappearance of some previously existing disease. The most common case of this kind is the sudden cessation of ague, of which numerous examples are found in the older writers. Among others, Fred. Hoffmann mentions instances in which the hiccup assumed both a continuous and periodical form. It has also been observed to ensue upon the disappearance of continued fever, gout, rheumatism, and cutaneous diseases, and upon the cessation of a natural or accidental evacuation, as the menses, hemorrhoids, and diarrhœa. When originating in this way, it is sometimes very tedious and obstinate; as, for example, when connected with amenorrhœa, not ceasing till the menstrual evacuation is re-established.

Among the circumstances which determine the occurrence, or rather the continuance of hiccup, we must include the force of habit. The influence of this cause is seen in most if not all of the convulsive movements to which the body is liable; and in none more so than in the one now under consideration.

Of the terminations of this affection little need be said. When unconnected with any other severe malady, it almost invariably disappears sooner or later, though its duration is, as we have seen, sometimes very protracted. Cases are, however, reported to have occurred, in which the hiccup itself was the cause of death. One has been already adverted to, in which it was symptomatic. The same author (Bobe-Moreau) relates another, also complicated with difficult deglutition, and speedily fatal; but no cause of the hiccup was discovered by dissection; nor have we any thing beyond conjecture to explain the fatal termination. De Lens, apparently following some preceding authority, states that prolonged hiccup produces swelling and redness of the face; thus implying the possible occurrence of cerebral congestion or of suffocation.

It has been before stated that hiccup sometimes follows and takes the place of other convulsive movements, in the production of which the respiratory muscles are chiefly concerned. In like manner it occasionally terminates in them. The most common instance appears to be that of sneezing: thus Hippocrates says, if hiccup be restrained, sneezing comes on, and the hiccup ceases; and Lanzoni and Bartholin met with hiccup alternating with violent sneezing after tertian ague.

Having thus mentioned most of the facts relating to this affection which seem worthy of notice, it will be proper to make a few remarks on what may be called its *final cause*. In many of the convulsive movements of the body, such as coughing, sneezing, and vomiting, this is in general sufficiently obvious, being either the expulsion of offending matter, or the protection of the irritated part by exciting secretion,

or the restoration of its interrupted circulation and functions. In others, as epilepsy and often asthma, the existence of such a cause, though not admitting of demonstration, seems deducible from a just analogy; and the same may be said of hiccup, at least when excited by some direct irritation of the stomach. In such cases, the final cause is evidently not the rejection of the offending matter; for this would be effected by the act of vomiting, which hiccup has little or no tendency to induce. It is conceivable that one end to which it is directed is the propulsion of the irritating matter towards the duodenum; and thus the final cause has been conjectured to be the removal of such matter from the cardiac extremity to a less sensitive part of the stomach. However this may be, it seems probable that the hiccup subserves another and perhaps more important purpose,—that of determining so much of vital energy to the organs of digestion, especially the stomach, as shall counteract the morbid influence exerted upon them, and induce a vigorous performance of their functions. Such a view well accords with that pleasurable sensation, referred to the epigastric region, which is stated often to follow a fit of hiccup. The same may be said of a fact already mentioned, the occurrence of hiccup as a termination (sometimes apparently a critical one) of continued and intermittent fevers, and also of its occasional appearance at the commencement of eruptive fevers. To these may be added another, mentioned in the first report made by Drs. Russell and Barry, on the cholera at St. Petersburg. These gentlemen observe it is “singular enough to say, hiccough coming on in the intermediate moments between the threatening of death and the beginning of reaction, is a favourable sign, and generally announces the return of circulation.”

Undoubtedly the above view of the final cause is most obviously applicable to those cases in which the hiccup appears as the effect and remedy of a temporary irritation; but it is by no means incongruous with others in which the affection is symptomatic of some grave or fatal lesion. The parts of our frame are so associated by that inexplicable bond which we call sympathy, that irritation in one organ commonly gives rise to a morbid condition or movement in others. This association is governed by certain general laws, often very imperfectly known to us, but the great end of which is manifestly the preservation of the whole body; and the operation of these laws continues, not only when it cannot produce any beneficial effect, but even when it becomes absolutely pernicious. Thus the hiccup which ushers in death is a fruitless effort of nature; while that which results from abdominal wounds, inflammation, or herniæ, may not only be inadequate to accomplish any good purpose, but may even aggravate the existing evil by a repeated concussion of parts which stand in need of perfect rest.

In relation to *diagnosis* generally, the presence or absence of hiccup does not appear to be a guide of much value, since it is pathogno-

monic of no one morbid affection, but appears under widely different circumstances, from an inconsiderable and temporary irritation to the most formidable and fatal lesions. In cases which present general indications of severe abdominal disease, but not such as enable us to localize it, hiccup may indeed point to some two or three organs more particularly, but it cannot justify us in allocating the disease in any one of them rather than in the others.

As a ground of *prognosis* it may be more valuable; though, for the reasons just stated, scarcely so much so as has been generally represented. Conjoined with other symptoms which portend death, it of course strengthens the evidence of its approach; and when it occurs in affections which have produced great prostration of the vital powers, it no doubt generally implies an expiring and ineffectual struggle of nature. Thus Hippocrates speaks of it as an alarming symptom after hemorrhage, vomiting, and purging; and Sydenham appears to have verified the observation, especially with reference to the aged. It is, however, to be borne in mind that even in such circumstances it sometimes indicates (as already stated of cholera) a successful effort of nature to bring about a salutary reaction.

It is not necessary to say much about the *treatment* of an affection which is mostly either too inconsiderable and temporary to call for medical aid, or else a mere symptom of some more formidable malady. In the slighter cases of idiopathic hiccup in which its recurrence seems chiefly the effect of habit, impressions of various kinds, made either upon the organs more immediately concerned, or upon the body generally, are adequate to remove it. Such are the emotions of surprise and fear, a forcible suspension of the act of respiration, sneezing, vomiting, protracted deglutition by sipping liquids, the administration of what are called antispasmodic medicines, including opium; of stimulants, as oil of anise, mint, &c.; of mineral acids, alkalies, and bitter tonics, especially quinine; cold aspersion of the body, &c. The efficacy of many of these remedies is no doubt partly or principally owing to their removing those disorders of the digestive function of which hiccup is so often a symptom.

In cases of a more severe or obstinate nature, cupping at the epigastric region, the application of blisters, sinapisms, and warm plasters to the same parts, and opiate friction, have been resorted to with success. Borrichius relates a case in which the affection returned annually at the same period, and each time yielded to a copious bleeding; a fact which illustrates the remark of Hippocrates, that hiccup, like spasm, may result from repletion (*πληρωσις*), as well as evacuation (*κένωσις*). When it depends upon causes of the latter class, opium is undoubtedly, as Sydenham has told us, the best remedy; and the same may be said of those cases of visceral disease or lesion, in which, supposing recovery to be hopeless, we must still attempt to remove, or at least to mitigate, a distressing symptom.

(Edward Ash.)

HOOPING-COUGH.—Hooping-cough has been described under a variety of names, many of which, as chin-cough, kink-cough, &c. refer to its prominent symptom. In France it is usually termed *coqueluche*; in Germany, *keuchhusten*, *stickhusten*, &c.; in Scotland *kinkhoast*. It was called *tussis convulsiva* by Willis, *tussis ferina* by Hoffmann.

The nosological term at present most generally employed to express the disease is *pertussis*, first given to it by Sydenham, and afterwards adopted by Cullen, who arranges it under the class *Neuroses*, order *Spasmi*. His definition of the disease is the following:—"Morbus contagiosus, tussis convulsiva, strangulans, cum inspiratione sonora, iterata, sæpe vomitus."

In the above definition may be found Cullen's opinion as to the contagious nature of the disease. Doubts have, however, been raised upon this point by Laennec, Desruelles, and others, though not supported in such a way as to invalidate the common notions upon the subject.

The disease appears to have two distinct stages. The first lasts generally from ten days to a fortnight, or even three weeks, and is not different from an ordinary catarrh; there is cough and coryza often with very little fever. At the end of a period varying from one to two or three weeks, the second stage commences, and is distinguished by the peculiar convulsive cough. In this cough a number of expirations are made with such violence, and repeated in such quick succession, that the patient seems to be almost in danger of suffocation. The face and neck are swollen and livid, the eyes protruded and full of tears; at length one or two inspirations are made with similar violence, and by them the peculiar *whooping* sound is produced: a little rest probably follows, and is succeeded by another fit of coughing and another whoop; until, after a succession of these actions, the paroxysm is terminated by vomiting, or a discharge of mucus from the lungs, or perhaps by both. Sometimes when the *kink* is unusually severe, blood is forced from the nose, ears, and even from the eye-lids; and occasionally it ends, without producing any discharge, in the complete exhaustion of the patient.

The number of paroxysms occurring during a day varies much in different cases, according to the severity of the disease; and the violence of each is diminished in proportion to the freeness of the expectoration. After the disease has continued at its height for two or three weeks, it begins naturally to decline; the paroxysms become less frequent and violent, the expectoration increases, the cough soon loses its peculiar characteristics, and finally wears away altogether, leaving the patient in perfect health. It is to be observed, however, that occasionally, several weeks after the cough has entirely subsided, it may return; and for a long time, if the patient accidentally catch cold, the cough will often assume the spasmodic character, and be accompanied with "the whoop."

We may safely assert, notwithstanding a con-

trary surmise advanced by some of the French writers, that hooping-cough rarely if ever affects the same individual twice; and as its usual period of occurrence is during childhood, we shall of course seldom meet the disease among adults.

It is also supposed to be very uncommon in early infancy (for the first two months)—an opinion which is generally true, although we have seen more than one instance of an attack in children three weeks old. When the disease attacks an adult, it generally wants the peculiar whooping inspiration, and the same thing is usually, but not constantly, observed in the cases of very young children.

Nature and seat.—A great variety of opinions have been advanced by different authors respecting the nature of hooping-cough; all, however, that have any bearing on practice may be reduced to the three following:—

1. It was considered to be essentially spasmodic, and to arise from irritation affecting either the brain or some parts of the nervous system, a theory advanced and variously modified by Cullen, Leroy, Löbenstein, Jahn, and Webster.

Dr. Webster's opinion is "that the actual seat of hooping-cough is in the head, and that the affection of the respiratory organs is only to be considered as a secondary effect, or as an effort of nature to relieve herself by expanding the lungs to an unusual degree, and thereby allowing a greater quantity of blood to flow into them, which may in some degree diminish the fulness and congestion in the head."^{*}

Löbenstein and Breschet favoured the idea of the disease having its origin in the phrenic and pneumogastric nerves.

2. A great number of celebrated names may be enumerated in support of the opinion that it is always an inflammatory affection of the bronchial membrane; amongst these are Guersent, Watt, Marcus, Laennec, Dewees, &c.

As the attention of Dr. Watt was particularly directed to hooping-cough attended with bronchial inflammation, in consequence of the death of two of his children from this cause, we shall here give an abstract of his general conclusions on the subject. According to him, "it is in all cases an inflammatory disease of the mucous membrane of the larynx, trachea, bronchi, and air cells;" and when mild, he says it may run its course without materially disturbing the other functions of the body, or even the functions of that very membrane where it is seated; and that, whenever it proves dangerous or fatal, it does so by the degree of inflammation in the natural seat of the disease, or by that inflammation extending or being translated to other parts.† Dr. Dawson differs from the other writers who support the inflammatory origin of hooping-cough, in confining its first seat to the membrane of the larynx, or, strictly speaking, of the glottis.‡

3. Some consider the disease to be at first

inflammatory, afterwards spasmodic. Desruelles advanced this opinion, and proposes to designate hooping-cough by the term "broncho-cephalite." According to him the disease consists of an inflammation of the bronchi complicated with irritation of the brain, the bronchitis being always primitive, the cerebral irritation always consecutive. So long as the bronchitis is simple, the cough has nothing peculiar; but as soon as the cerebral irritation occurs, the diaphragm and respiratory muscles, and those of the glottis and larynx, are drawn into spasmodic action, and the cough changes its character and becomes convulsive.

This theory has the great recommendation of being in accordance with the practice which has been found most beneficial in the treatment of the disease; and it has been justly remarked that the effects of remedies, if accurately observed, are like chemical tests, frequently the means of detecting important differences in objects which otherwise could not have been distinguished from each other.

Amongst so many different opinions respecting the nature of the disease, and the sources from which danger most frequently arises, the young practitioner is left without any steady guide to regulate either his prognosis or his practice.

There can be little doubt that much of this confusion has arisen from the attention of practitioners having been directed so particularly to certain complications as to lead them to overlook the simple disease itself. In order to avoid this error, and to give (as it is hoped) a clearer view of the subject, we shall consider hooping-cough under the four following divisions:—

1. Simple hooping-cough.

2. Hooping-cough complicated with bronchitis or peripneumony.

3. Hooping-cough complicated with disordered bowels or infantile remittent fever.

4. Hooping-cough complicated with convulsions or hydrocephalus.

1. *Simple hooping-cough.*—The disease may be called *simple*, where, after it is fully formed, the fits are neither frequent nor violent, the expectoration is moderate, and the child during the intervals of the cough is quiet, retains his appetite, sleeps well, and without fever or difficulty of breathing. A child will be playing apparently in good health, when suddenly he drops his playthings, rushes out of the room, and is heard to cough, whoop, and discharge the contents of his stomach; immediately after which he returns, calling out loudly for something to eat. In a few minutes after the paroxysm, his pulse will be quite tranquil; and if the stethoscope be applied to his chest, the respiration will be heard perfectly natural, without any mixture of wheezing.

In such a case the disease must be considered almost, if not altogether, free from danger, and it is scarcely reasonable to suppose the existence of bronchial inflammation.

It may be said that cases of this description are rarely to be met with, and this must be admitted; but if children always lived in pure air, and were in perfect health when attacked

^{*} Med. and Phis. Journal, Dec. 1822.

† Treatise of Chicough, Glasg. 1815.

‡ Nosological Practice of Physic, London, 1824.

by the disease, and if it occurred during the summer season, such cases would be much more frequent.

As this combination of favourable circumstances, however, rarely occurs, so we seldom meet the disease in this simple form; but its occurrence even in a single instance decides the question that the disease, in the second stage at least, is not necessarily inflammatory, as we can hardly presume an inflammation to exist without any symptoms of inflammation being present.

2. *Hooping-cough complicated with bronchitis or peripneumony.*—The symptoms of this complication, though sometimes obscure, are generally well marked. According to Cullen, hooping-cough hardly ever proves fatal without considerable dyspnoea having existed for some time. It would appear that in older children, when the disease proves fatal, it is most commonly in consequence of inflammation supervening in the mucous membrane of the lungs. In very many instances where the state of the lungs was ascertained by dissection, the most remarkable phenomenon that presented itself was an inflamed condition of the bronchi, which were almost entirely plugged up with frothy mucus and sero-purulent fluid.

A point of the greatest importance in the treatment of the disease is to watch the earliest symptoms of bronchitis, as upon their speedy removal will principally depend the safety of the patient.

We are warned of the occurrence of bronchitis when the pulse becomes permanently quick, small, and hard; the fits of coughing become more frequent and more distressing, and the breathing is hurried in the intervals of the paroxysms; when any exertion or speaking causes increased difficulty of breathing or panting; the lips acquire a livid hue, and the extremities shew a great tendency to become cold.

As the disease advances, the pulse becomes more frequent, the difficulty of breathing increases, the *alæ nasi* are alternately contracted and dilated, and there is great prostration of strength; in many cases the cough is nearly suspended, and when it does occur, it is not accompanied by the usual whoop, and the difficulty of getting up the mucus is greatly increased.

The respirations vary from 60 to 100 in a minute; and if, after having maintained this frequency for twenty-four or thirty-six hours, they come down to 40 or 50, the change generally indicates recovery.

There is considerable and permanent wheezing for the two first days, not audible unless by aid of the stethoscope or by applying the ear to the chest, after which it increases and becomes quite perceptible by laying one hand on the chest and the other on the back. The wheezing is greatest after sleep, or immediately before a paroxysm of coughing.

When the bronchial inflammation cannot be checked, the breathing becomes more hurried and laboured; the wheezing increases; stupor

and prostration succeed; the cough is suspended; the pulse becomes nearly imperceptible; the extremities cold; and in the course of eight or ten days from its commencement death ensues from the accumulation of mucus, which apparently produces suffocation.

When the attack terminates favourably, the breathing becomes less hurried, the wheezing diminishes, the cough after a temporary suspension returns, the fever subsides, the countenance assumes a more healthy appearance, and quiet sleep succeeds to distressing restlessness.

On examination after death, the most usual morbid appearance is inflammation of the mucous membrane. The lungs collapse imperfectly, and when cut into, an abundance of frothy and puriform mucus exudes from the bronchi and air-cells. Increased solidity of the lung has often been found, and by some it is said to be constantly observable. When it does occur, it would appear that the inflammation had extended from the mucous membrane to the substance of the lung, or attacked both its textures.

3. *Hooping-cough complicated with disordered bowels or infantile remittent fever.*—These, though present, are much less formidable combinations than the last, but still they render the disease very intractable.

If we find a child in this disease breathing heavily, with foul tongue, loss of appetite, tumefied belly, and the discharges from the bowels unnatural in colour, consistence, or smell, we may rest assured that, unless these symptoms are removed by the prompt use of medicine calculated to effect that purpose, much distress will eventually ensue. Infantile remittent fever will next arise, and this may itself prove fatal, or lead to hydrocephalus.

A great number of the long-protracted cases of hooping cough are complicated with remittent fever. After the symptoms just enumerated have continued for a longer or shorter time, the fever makes its appearance, sometimes commencing with a rigor; more frequently, however, it comes on so gradually, that we do not know precisely when to date its commencement. The paroxysms of coughing become more frequent, and the breathing is quickened and oppressed; but still it may be with a little care distinguished from the attack of bronchial inflammation. The stethoscope affords us useful though negative evidence. The usual symptoms of bronchial inflammation are absent. The frequency and force of the respiration are found increased, but this increase is not accompanied by any râle indicative of bronchial inflammation; while the daily remissions, the loaded tongue, the nature of the alvine discharges, the aspect of the child constantly picking his nose and lips, all serve to determine the true character of the disease.

4. *Hooping-cough complicated with convulsions or hydrocephalus.*—Every one who has seen much of hooping-cough is aware that when it occurs during the period of dentition, it is frequently accompanied by convul-

sions, and that they are among the principal sources of danger at that age.

This complication may be accounted for in like manner as the bleeding from the nose, ears, &c.—namely, by the interruption given by the violence of the cough to the free return of blood from the head, and also by the circumstance of children being so liable to convulsions at this period of their lives.

It is said that the child may be carried off by one of the convulsions: this, however, very rarely happens. After their frequent return, the case may pass into hydrocephalus.

In a child from seven months to two years of age who has the hooping-cough, if we observe that the paroxysms become suddenly increased in violence, that the thumbs are drawn into the palms of the hands, while there is no accession of bronchial inflammation to account for the increase of cough, we may apprehend convulsions. If, however, in addition to these symptoms, the child, after each fit of coughing, instead of whooping becomes livid, we may calculate to a certainty on convulsions, if suitable means be not employed to ward them off. If the child has ever had the swelling of the top of the fingers and toes, noticed by Dr. Kellie of Leith, or that peculiar spasmodic affection described by Dr. Clarke and more recently by Dr. Marsh, under the title of Spasm of the Glottis, (see GLOTTIS, SPASM OF,) we can scarcely expect that it will pass through the hooping-cough without an attack of convulsions.

It is sometimes important and always desirable to be able to say if the convulsions in these cases depend upon disease in the head; and rules have been laid down for ascertaining this point, but they are not altogether unobjectionable. It is said, that in hydrocephalus one side of the body is more affected than the other, but in convulsions which are independent of organic disease of the brain, that both sides are equally affected. If the convulsions are distinctly confined to one side of the body, there is every reason to fear the existence of hydrocephalus; but it certainly does not follow, because the convulsions are general, that the brain is unaffected. In the latter case we must wait until the convulsions subside before we can discover their cause, and then we must form our opinion from the general state of the child and the history of the case, rather than from any peculiarity in the convulsion itself.

When hydrocephalus supervenes upon hooping-cough in a child under two years of age, it is almost uniformly preceded or accompanied by convulsions; occasionally, however, it creeps on more insidiously, and we have several times been called upon to see a child in a state of stupor, with one arm sawing the air, whilst the other side was paralysed; and yet neither the parents nor medical attendant were aware of the nature of the case, but were solely occupied in attending to the cough.

Where hydrocephalus prevails in the family, we must, whenever the children are

attacked by hooping-cough, be on the look-out for the earliest symptoms. If there are fits of drowsiness and languor, aversion to light or noise, occasional headache, screaming out during sleep, grinding the teeth, frequent sighing; after more or fewer of these symptoms, if the child is attacked with fever, accompanied by greater irritability of stomach than we can account for or than is natural in hooping-cough, and if, to use the words of Dr. Cheyne, "purgatives produce mucous rather than feculent stools," we may safely consider that our most strenuous exertions will be required for the averting of this formidable malady.

The approach of hydrocephalus in these cases has been occasionally overlooked in consequence of mistaking the laborious respiration arising from oppressed brain, and considering it to be the effect of bronchial inflammation. The assistance of the stethoscope would be here most valuable, but unfortunately the restlessness and crying of young children renders its application in many cases difficult if not altogether impossible, and we are often obliged to form our opinion from the character of the breathing. In hydrocephalus the breathing is not permanently quick; it is irregular and sobbing; occasionally the child sighs heavily, expanding the chest in a manner that never takes place in inflammatory affections of that cavity.

Prognosis.—It is generally supposed that hooping-cough is more dangerous in proportion to the youth of the child, and it is certainly true that the majority of its victims are under two years of age. It is, however, equally true that a healthy child under six months, who has a good nurse, will get through the disease better than one a few months older, who has been recently weaned, or in whom dentition has commenced. The following circumstances would lead us to give a favourable prognosis: dentition being completed, and the head, bowels, and lungs not being subject to determinations or irritations; the season of the year being mild and dry; the patient not suffering or not having recently suffered from any other of the diseases of childhood, and having a sound, healthy constitution; finally, the accessions being at long intervals, the remissions complete, and the night, during which the *symptoms are usually most severe*, well spent. In adults, owing to their greater strength of constitution and lesser liability to the diseases which usually produce a fatal result in hooping-cough, the prognosis will be more favourable.

General treatment.—The treatment of hooping-cough has always been considered as difficult; indeed it is generally admitted that, even in the mildest form, it will run its course without *much* interruption or abbreviation from medicine. From this consideration it would appear that in the *simple* hooping-cough very little medical interference is required; and judicious practitioners content themselves with giving every night a few grains of rhubarb and ipecacuan proportioned to the age of

the patient, with an occasional emetic; confining the child to a milk and vegetable diet, and, during the existence of the catarrhal symptoms, to an equable temperature. The latter advice leads us to speak of the popular error, too often countenanced by practitioners, of unguardedly exposing the child to cold and open air. We shall shortly find that change of air is often very beneficial in a later stage: but when the first or catarrhal stage exists, we should adopt the practice now recommended. Mr. Pearson's plan of treatment is applicable to the simple disease. He prescribes in the first instance an antimonial emetic, and afterwards, for a child of one or two years old, a draught containing a drop of tincture of opium, five drops of ipecacuan wine, and two grains carbonate of soda, to be repeated every fourth hour for several days. When purgatives are required, he gives rhubarb and calomel. As the cough subsides he diminishes the opiate, and substitutes gum myrrh in place of the ipecacuan wine. It is important to hold in mind that to patients labouring under hooping-cough, the great danger is from the complication with bronchitis; and in the treatment of the simple disease, our attention will be chiefly required to obviate this predisposition. The state of the lungs must be watched, and any approach to inflammatory symptoms met early by bleeding and purgatives, and (if the age of the child does not forbid) by tartar emetic. The latter medicine will also be found of use by facilitating the unloading of the stomach, which usually terminates a fit. Should the weather be cold, it will be well to have the child warmly clad, and to direct the use of flannel next the skin. When, under treatment of this kind, the disease gets through its course without any unpleasant events, and reaches the period of decline, we often find that although the patient be otherwise quite well, the cough will still continue. In such a case, when our interference appears to be necessary rather to break a habit than cure a disease, we shall often find change of air to be the very best remedy. At this period, also, antispasmodics and sedatives may occasionally be employed with advantage. The oxide of zinc has been recommended by Guersent in doses of a grain every hour for a child of six months old; and in a case of the disease with some threatenings of convulsions, we on one occasion found benefit from musk. The latter medicine has also been highly recommended to us by a practitioner of considerable experience.

A cough mixture, containing a small quantity of tincture of opium or syrup of poppies, will sometimes be of use, as will also the laurel water, or, in adults, prussic acid itself, administered with due caution. In cases where considerable debility exists, or the disease, towards its close, becomes manifestly intermittent, the tonic plan may be required, and sulphate of quinine will be found to act most beneficially in conjunction with change of air and diet.

Various external applications are popular in the treatment of hooping-cough, as the patent

medicine called "Roche's embrocation;" and the "pommade d'Autenrieth," composed of a part and a half of tartar emetic with eight parts of lard. These, however, are means very secondary indeed, in the treatment of any of the complications of the hooping-cough. In the simple disease embrocations which merely redden the surface can do no harm, and are sometimes useful, but applications containing tartar emetic or other violently stimulating substances, in addition to being unnecessary, very often produce pustules and ulcerations, which materially augment the sufferings of the patient.

Treatment of complications.—The first complications of which we have spoken are inflammation of the bronchial mucous membrane, or of the substance of the lungs itself,—bronchitis and peripneumonia. And in truth it is to the guarding against these affections that much of our attention and remedial measures must be directed in the treatment of the simple disease. When from the occurrence of the symptoms mentioned above, we have reason to suppose the existence of one or both of these inflammations, we must at once take decided steps to cut short the disease, if possible; or should that not be practicable, to promote the speedy expectoration or absorption of the fluids effused into the bronchi and air-cells. The means of effecting the first of these indications are obviously those applicable to similar inflammations under ordinary circumstances, in which we do not propose at present to enter. A few peculiarities, however, are to be attended to in their use, to which we shall briefly advert. In the first place, we must observe that in bronchitis supervening upon hooping-cough, a more free use of the lancet is warranted and required than would be advisable in other cases, and for the reasons already mentioned that it is proved both by the symptoms and appearances after death, that the substance of the lung is almost always affected. With respect to the employment of purgatives, we would also remark, that although it is very necessary to attend to the state of the bowels, still continued purging will be found to produce a degree of flatulence, which by exerting pressure upon the diaphragm will considerably increase the dyspnoea, irritate the mucous membrane, and needlessly debilitate. We shall occasionally meet cases attended with so much irritability of the stomach and bowels as to prevent altogether the use of either ipecacuan or antimonial medicines. In these instances, of course, our reliance must be chiefly upon the lancet, aided by blistering, the warm bath, and small doses of nitre. In following up the second indication, after effusion into the bronchi and air-cells has taken place to any extent, we must be very cautious about the further abstraction of blood; this stage being attended with considerable debility, and our object being to prevent such exhaustion as would interfere with the process of expectoration. It is at this period we may expect most benefit from blistering, both by arresting inflammation and

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preventing further effusion.* To promote expectoration in older children, we may employ antimonials or a combination of calomel and ipecacuan in repeated doses. In very young infants, when the use of antimonials is not advisable, we may give an occasional emetic of ipecacuan wine and syrup of squills, and in place of calomel substitute hydrarg. cum cretâ in combination with pulv. ipecac.

We shall now turn our attention to the next train of morbid actions which we have mentioned as being occasionally attendant upon whooping-cough—a disordered state of the bowels and infantile remittent fever; and as these complications are rarely met with except in children, our observations principally apply to them. In speaking of the treatment of the simple form of whooping-cough, we alluded to the frequent occurrence of derangement of the bowels. This tendency exists in all acute diseases of children, and in practice it will be found that the most marked improvements in the symptoms of the original disease will attend the correction of the alvine discharges. It is important, therefore, to meet the symptoms indicating derangement of the bowels by keeping up their regular action. If actual constipation exists, active purgatives will be required. Nothing is better for children than a combination of scammony, rhubarb, and calomel in divided doses, repeated until a full effect be produced. For patients more advanced, one or two grains of calomel, or three or four of blue pill, followed by any mild purgative mixture, may be administered. When the secretions are merely altered in quality without constipation, mild laxatives only will be required, as rhubarb and hydrarg. cum cretâ in the younger, and blue pill and rhubarb in older patients. The state of disease we are speaking of has been accurately described by Dr. Hamilton as the first stage of marasmus, and some very judicious observations are made by him upon its treatment. Unfortunately, however, the fatal facility of the purgative system has led to its adoption in this affection to an extent that has been very injurious, and was certainly never authorized by that able physician. Where the purging has been carried to excess, tenesmus, scanty mucous stools, tenderness of the belly, and a degree of tympanitic fulness succeed, which greatly aggravate the cough. Our object must then be to allay irritation by warm fomentation to the abdomen, soothing enemata, and sometimes, when the tenesmus is very distressing, by the employment of opiate glysters. When the bowels are so irritable as to be acted upon by the force of each cough with fetid depraved stools, a state which sometimes occurs in whooping-cough, small doses of hydrarg. cum cretâ and Dover's powder, followed by castor-oil, usually gives relief. When the symptoms become decidedly those of remittent fever, it is to them we must

direct our treatment rather than to the original disease, as we shall always find the cough to become more distressing in a ratio with the increase of the fever, and on the other hand to be proportionately relieved by its decline. For the management of this form of fever we must refer to the article upon that subject. (See FEVER, INFANTILE REMITTENT.) We may remark, however, that the observations offered above upon the administration of purgatives are even more particularly applicable here. A torpor of the intestines often exists to so remarkable a degree, as to render doses of purgative medicine quite inert that would at other times be amply sufficient. This we have been in the habit of accounting for by the congestion that exists in the head, and accordingly have found in practice that when strong purgatives have had no action by themselves, abundant effect was produced by a much milder one employed after a general bleeding, or, if the strength of the child did not permit this, after the application of leeches to the temples or epigastrium.

The last formidable complications of whooping-cough we have noticed are convulsions and hydrocephalus. When any of the symptoms already mentioned as premonitory of convulsions occur, our treatment must be guided by what we can learn of their causes and tendencies in each particular case. The convulsions of children, whether they are idiopathic or complicated with whooping-cough, generally depend upon the irritation of teething, irritation of the alimentary canal, or disease of the brain itself; and the tendency most to be dreaded is the hydrocephalic.

The indications, therefore, are to remove these irritations by attending to the state of the gums, by regulating the action of the bowels, and obviating local determinations, particularly to the head. When, in spite of our best directed efforts, convulsions, as will be frequently the case, do supervene, they must be treated according to the general principles laid down for their management under ordinary circumstances. When the attacks recur frequently and baffle the usual means of cure, there are two plans by which we shall often be able to prevent their return: one is, a total alteration of the child's diet, the other a complete change of air. When the child affected is at the breast, defectiveness of quantity or quality will usually be detected in the nurse's milk. Often it will be found that she has menstruated, or, as sometimes happens, that, without the discharge actually occurring, she has experienced sensations similar to those which attend the accession of the catamenia. In such cases the milk almost uniformly disagrees, and here it is a good rule, whenever the convulsive attacks withstand ordinary treatment, to enquire closely into the state of the nurse, and if there be any grounds for suspicion, to have a young and healthy one procured. Change of air often in the most remarkable manner puts a stop to the recurrence of convulsions, and will be found particularly beneficial in those cases of spasm of the glottis to which we have already alluded.

* The practitioner must, of course, hold in mind the danger of incautiously applying blisters to children.

Both these means will also act most usefully in protracted attacks of whooping-cough, even where there is no tendency to convulsions.

For the treatment of hydrocephalus, when it supervenes upon whooping-cough, we must refer to the article upon that disease. With respect to its prevention, the remarks made upon deranged bowels and convulsions are equally applicable as to those complications. One thing is to be remembered, that in conjunction with whooping-cough hydrocephalus is more than usually fatal, and requires our whole attention to its management.

Specific remedies.—An immense variety of these has been brought into notice, but if the views above offered be correct, their value will be less estimated. From what we have said of the simple disease, it will be seen that such medicines must be superfluous. Some of them from their violence are dangerous, and in the various complications it must be evident that no specifics are admissible. However, as some are strongly recommended, and may perhaps occasionally be of use in the decline of the disease, when the cough has become habitual, we shall give a list of the most remarkable, adding the names of those who brought them into notice.

Opium,	recommended by Dr. Kirkland.
Cicuta,	..... Dr. Butter.
Belladonna,	..... Dr. Buckham.
Digitalis,	..... Various authors.

Bark,	..... Dr. Cullen.
Cup moss,	..... Mr. Hayes.
Arsenical solution,	..... Mr. Simmons.
Nitrate of silver,	..... Mr. Jones.

Assafœtida,	..... Dr. Millar.
Castor,	..... Dr. Morris.
Musk,	..... Mr. Hayes.
Artificial musk,	..... Dr. Hufeland.
Camphor,	..... Popularly.
Oil of amber,	..... Dr. Underwood.
Meadow narcissus,	..... Mr. Dufresnay.

Alkalies,	..... Dr. Stutz.
Antimonials,	..... Dr. Fothergill.
Cantharides,	..... Dr. Burton.
Acetate of lead,	..... Sauvages.
Cochineal,	..... Popularly.
<i>Alum,</i>	..... <i>Dr. Davis.</i> (C. Johnson.)

HYDATIDS.—This word (derived from *ὑδαρίς, vesicula, ὑδωρ, aqua,*) has, in descriptive pathology, been indiscriminately applied to pellucid cysts containing a transparent fluid,* developed either in the cavities, or in various tissues of the human body, as well as in those of the inferior animals. These cysts, on minute examination, having been found to vary considerably in structure, and in some instances to possess the characteristics of animal life, an extended signification has been attached to the term, and it has been adopted as the name of an order of animals or animalcules, consisting of several genera and species.

It may be presumed that animal bodies have been subject to such vesicular formations from the earliest period, and the records of medicine abundantly testify that their occurrence has been commonly noticed from the time of Hippocrates to the present day, though, until a recent date, their real nature seems to have been little investigated. It must, however, be acknowledged that even up to the present time the term *hydatid* has a very indefinite meaning.

The general appearance of these bodies has probably had an influence in limiting the opinion entertained by medical men of their morbid effects to mechanical action, and experience has hitherto afforded no reason which invalidates it: it is to this cause probably that we must attribute the common notice of their occurrence by the early writers on medicine, without further description than that which the etymology of the word *hydatid* conveys; and as we find little in their observations which can serve to elucidate the subject, we shall endeavour to be very brief in showing how far they attracted their notice.

Hippocrates has adverted to them in his general application of the word growth, *φύμα*, particularizing this kind by the nature of the contents; and he seems to have been well aware of their occurrence in some of the inferior animals as well as in man. It is remarkable, however, that he has only noticed their presence in the chest, a part of the body in which they are not most frequently observed, and where they are in general acknowledged to be only simple cysts.

Such were probably the nature of those to which he has alluded as the precursors of anasarca and hydrothorax, and as occurring frequently in the ox, the dog, and in swine, quadrupeds in which he says growths on the lung, containing water, were most frequently found, as dissection testified:—"And such things (he adds) seem to be formed in man more than in cattle, inasmuch as our diet is more conducive to disease."^{*}

Aræteus alludes to a species of dropsy in the abdomen, *occasioned by several small bladders*, in proof of which he says, if the abdomen be pierced, a very small quantity of water escapes, these bladders including it; but their origin and nature he confesses were unknown to him, and adds that there were some who affirmed that bubbles of this kind passed through the intestines into the belly.† Celsus probably alludes to dropsy from the same cause in the observation, "*modo corpus inæquale est tumoribus aliter aliterque per totum id orientibus;*" but makes no direct mention of hydatids, or other reference to them.‡ Galen noticed the aptitude of the liver to generate them, and their frequent presence in this organ in animals killed without disease;§ they are referred to also by Ætius;|| and in the compilations of

* Περὶ τῶν ἐν τοῖς παθῶν, sect. v. p. 544.

† Lib. II. cap. i. 51.

‡ Lib. III. s. xxi.

§ Comment. in Aph. 55.

|| Serm. x. cap. 20, p. 234.

Bonetus, Morgagni, and Van Swieten, are introduced, from various sources, numerous observations on hydatids in man as well as in the inferior animals. The idea of the animal nature of hydatids, which appears to have first excited attention to the difference of bodies referred to under this name, was broached by Hartmann* in the year 1685, and was the result of a more particular examination than had been before instituted on some taken from the inferior animals; it was particularly suggested by his witnessing their motions when immersed in warm water: his observations, however, seem to have been unknown to our countryman Dr. Tyson, when in the year 1691 he published in the Philosophical Transactions (No. 193) a paper entitled "Lumbricus Hydropicus, or an essay to prove that hydatids often met with in morbid animal bodies are a species of worms or imperfect animals." It should be particularly borne in mind that Tyson's observations were made from hydatids found in the dissection of a gazella or antelope, and were consistent with a preconceived suspicion (by what circumstances suggested he does not inform us) that such hydatids were of the insect tribe, or at least their embryos or eggs. His reasons for this supposition, he states, were, first, that he observed them to be included in an outward membrane like a matrix, so loosely that, by opening it with his fingers or a knife, the inward bladder containing the lymph or serum seemed no where to have any connection or hold to it, but very readily dropped out, still perfectly retaining its contents:—secondly, from observing with the naked eye, that to the inward bladder there was attached a neck or white body more opaque than the rest of the bladder and protuberant from it, with an orifice observable at the extremity, which seemed to be occasioned by the retraction of some part of it inwards, serving, as he conjectured, the purpose of a mouth to suck the serum from the outward membrane, and so to supply its bladder or stomach, organs with which his imagination had also supplied it: thirdly, by finding, with the testimony of another observer, that this neck, on being approached to the flame of a candle, did really move, at first protruding, and then retracting itself. On further examination, two small strings or pipes were observed proceeding from the neck, and floating in the liquor, the object of which Dr. Tyson conceived was to convey from the mouth the pabulum of the animal, derived by suction from the outer involving membrane. "Perhaps some," he adds, "may be more inclined to think that the whole is but an egg or embryo of another insect formation, and that this bladder is as it were the amnion, and the outer coat that includes it the chorion;" but having observed the same peculiarity of construction in every one of several hydatids taken from a rotten sheep, he considered such a supposition void of probability. The hydatids of the human body Tyson seems also to have minutely exam-

ined, and the circumstances in which he found them to differ he has noted in the record of a case so illustrative of the subject and fortunate in its termination, that we deem it well worth transcribing in this place:—"Thus in a patient still living, and enjoying her health better than all her lifetime before, about ten years of age, I caused her right side to be opened a little below her short ribs, whence issued out abundance of limpid water; but what was most surprising, together with it a great many hydatids, that first and last we guessed there might come out about five hundred of these bladders: most were entire and filled with limpid water, of others that were too large for the orifice the films were broken, but in none of them could I observe the neck, though I was inquisitive to find it, which makes me think them to be different from our present subject; as are also those I have frequently met with in the ovaria of women who have died hydropical, which I take to be only the eggs contained there, which by an extravagant flux of humours into them are often swelled to that prodigious size that I have taken several gallons of liquor out of them." Dr. Tyson further adverts to hydatids without necks, which he had found in the bladder of a human subject. "I shall only add," he says, "that the lumbrici hydropici I have always found hanging to the membranous parts rather than included in the body of any of the viscera, as to the omentum peritoneum or the outward membranes that cover the stomach, liver, colon, or other intestines." Hydatids of this kind were afterwards examined by Pallas,* and named by him *tæniæ hydatigenæ*, from the resemblance of their heads to those of the common worm of that genus. They have been further recognized as animalcules and adopted as such in the classifications of Linnæus, Fontana, Muller, Bloch, Werner, Cuvier, Lamarck, Zeder, Rudolphi, and Laennec. With regard to hydatids of the human body, Pallas has noted that those which came under his examination were void of neck and head, but that they evinced considerable contractility, as was exemplified by the retraction of their coats on division with a knife, "and with such force as to be turned almost inside outwards." The insect nature of the former having been acknowledged, the property just noticed was considered a title to the credit of distinct animalcular life in the latter, which had hitherto been regarded as morbid products endowed with the mere organic life of the parts with which they were found in contact. The new hypothesis seems to have been generally received with little further examination, and to have gained additional confirmation by the observations of Dr. John Hunter, published in the first volume of the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge for the year 1793. In this paper are detailed the case and dissection of a subject, with the result of an examination

* Miscel. Zool. Ed. Hagæ Comitum, 1766, p. 157.

* Misc. Nat. cur. Dec. 2 A. 4to.

of some hydatids, taken from a collection found between the neck of the bladder and the rectum, compared with others which presented themselves in the abdomen of a rotten sheep. The just estimation of Dr. Hunter's evidence will induce us to draw largely on the information he has left on record; we cannot, however, but remark with regard to hydatids of the human body, that he has expressed himself in language presumptive of data acknowledged by him to rest only on probability, assuming the endowment of the highest functions demonstrative of animal life, for bodies in which the existence of the lowest order was a question yet undetermined. It is worthy of remark that the hydatids of the gazella examined as we have already stated by Tyson, were found in a situation in that animal corresponding to that of the human subject from which Dr. Hunter's specimens were taken.

From the period at which animalcular life became a distinctive characteristic of certain hydatids in the inferior animals, and that this property, though on more slender evidence, was assigned to some others which were found in man, the prevailing inclination among medical writers and in oral communication has been to appropriate the term hydatid to those apparently so endowed; hence they have been denominated true hydatids; and to other pellicular cysts, formerly so considered, the epithet false has been applied in contradistinction.

From the preceding remarks it will be obvious that things most diversified in nature have been incongruously confounded under one name, and that to view them in their clear light as well as to see their pathological bearings with any profit or advantage, they must be severally considered with the definite signification proper to the classes in which nature presents them. These appear to us to be three in number, the *first* of which comprehends those hydatids which evince in their structure and properties the unquestionable endowment of distinct animalcular life. The *second* consists of such as have no evidence of animalcular life either in their construction or properties, but which has been assigned to them from certain phenomena, presently to be noticed, connected with their situation and growth. The *third* division embraces such as are universally admitted to have no place in the animal kingdom, but which may be regarded as excrescences or morbid formations, arising out of the natural tissues and organs of animal bodies.

The animalcular hydatids to which our first division refers have been observed to vary considerably in their structure, and have been ranged by naturalists in four distinct genera placed in the order *Vermes*, and thus designated, *H. cysticercus*, *H. polycephalus*, *H. ditrachyceros*, and *H. echinococcus*: to these a fifth genus has been added, constituted by the hydatids of our second division, the real nature of which, to say the least, is questionable, though they are commonly considered to belong to the insect tribe, and described as such under the name of *H. acephalocystis*.

The occurrence in the human body of the first four genera, and their specific consequences, have been little if at all investigated by the pathologists of our own country, and we find recorded by them only a single case in which any of them are particularly referred to. This case appears in the tenth volume of the London Medical Journal, but contains merely the statement that the patient had voided a number of *tæniæ hydatigenæ*, a name synonymous with the cysticercus of the above classification, and with the lumbricus hydropicus of Dr. Tyson, which, as we have already stated, was described by him and also by Dr. Hunter from specimens taken from the inferior animals. That their occurrence in the human body is not frequent, we infer from their having been rarely noticed by writers on pathology or medicine; but as minuteness of structure may have been more frequently overlooked than we have reason to suppose, and as they have been particularly adverted to on high authority, the following description, for which we are indebted to the labours of Cloquet,* will, we conceive, be an acceptable guide for future comparison and enquiry.

Genus 1. Hydatis cysticercus, Rudolphi; from *κυστίς, vesica* and *κέρκος, cauda*. Body nearly cylindrical or slightly depressed, wrinkled, terminated by a caudal vesicle; head furnished at its base with four parts or suckers.

Sp. 1. Cysticercus tenuicollis, Rudolphi. Syn. vermis vesicularis, Hartmann; hydra hydratula, *Linnaeus*; *tænia hydatigena, Pallas*; vermis vesicularis eremita, *Bloch*; hydatigena orbicularis, *Goeze*; hydatigena globosa, *Batsch*; vesicaria orbicularis, *Schrank*; *tænia globosa, Gmelin*; hydatis globosa, *Lamarck, Bose, Brugnières*; cysticercus lineatus, *Laennec*; cysticercus globosus, *Zeder*.

Character.—Head almost tetragonal, snout cylindrical, a little crooked, neck short, body small, caudal bladder nearly spherical. *Habitat*.—The peritoneum and pleura of ruminating animals, and of swine, especially in sheep, oxen, and goats, in the stag, the roebuck and gazella. A single instance is cited by Goeze of this species of hydatid having been found in the plexus choroides of an apoplectic human subject.

Sp. 2. Cysticercus cellulosus, Rudolphi. Syn. finna humana, Werner; *tænia hydatigena ovilla, Fischer*; *tænia cellulosa, v. finna, Gmelin*; vesicaria hygroma, *v. finna, Schrank*; hydatis finna, *Blumenbach*; vermis vesicularis, *Brera*; cysticercus finna, pyriformis, albo punctatus, *Zeder*; *tænia hydatigena anomala, Steinbach*; cysticercus finnus, *Laennec*.

Character.—Body conoid, from four to ten lines in length, caudal bladder ovoid, formed by a thin membrane, equal, transparent, without fibres; head tetragonal, furnished with four suckers, and thirty-two hooks divided into two rows. *Habitat*.—The hog, in which animal it causes the disease commonly known under the name of leprosy.

* Dict. des Sciences Méd. Art. *Hydatid*. Paris, 1818.

The word *finna* applied to this species of hydatid is of German extraction, from *finnen*, the name of this disgusting affection. Werner is reported to have found this species of hydatid in man.

Sp. 3. *Cysticercus fischerianus*, *Laennec*. Body round, very slender, annulated; head larger than the neck, furnished with suckers and crooks; caudal bladder pyriform, three or four lines in length, united to the body by its large extremity, and terminating in a point which adheres to the viscus which this worm inhabits. No cyst. *Habitat*.—This hydatid has been found twice in the plexus choroides of the human subject, by M. Fischer of Leipsic. It is yet but little known.

Sp. 4.—*Cysticercus dicystus*. This worm has been observed but once, and then by *Laennec*; he met with it in the ventricles of the brain of a man who died of apoplexy. It presents two pretty large bladders; one of these is caudal, whilst the other encloses the body anteriorly. This, which consequently is only developed in a bag which forms part of the animal itself, is conical, annulated, composed of an outer membrane of a yellowish colour, rather transparent, and of an anterior substance, white and rather bluish, and almost opaque. It is crossed by a large canal, terminating in a cul-de-sac at the side of the head, but which at the other extremity communicates with the caudal bladder. The number of hooks of the head is undetermined. It has only four suckers.

Sp. 5.—*Cysticercus albo punctatus*. M. Treutler is the only person up to the present time who has observed this hydatid; he found it in the plexus choroides of a woman who died at twenty-two years of age.

The body of this hydatid is three times longer than the caudal bladder. M. Treutler thought that he distinguished, with the aid of a magnifying glass, one sucker and six hooks. The caudal bladder is spherical and sprinkled irregularly with small white points.

Genus 2.—*H. polycephalus*, *Zeder*; *cænu-rus*, *Rudolphi*, from *πῶλος*, *multus*, and *κεφαλή*, *caput*. The derivation of the name of this genus explains its principal character. There are two species of it, viz. the *P. cerebralis*, and the *P. granulatus*; but as neither of them has been found in the human species, we shall pass on to

Genus 3.—*H. ditrachyceros*, from *δις*, *bis*, *τραχὺς*, *scaber*, and *κέρας*, *cornu*. Only one species of this vesicular worm has been noticed, viz. the *D. rudis*. The following is its character: Body oval, a line and a half long, flattened, terminated in a point posteriorly, enclosed in a membranous bladder, furnished anteriorly with a bifurcated horn, which appears rough to the naked eye, and, seen through a microscope, to be thick-set with straight and long scales. In which particular organ is the usual nidus of this hydatid is unknown. The specimens which Sultzter had an opportunity of observing had been expelled by stool from a young woman after having taken a purgative.

Genus 4.—*H. echinococcus*, from *ἰχθῦς*, *echinus*, and *κύκλος*, signifying a body of a round form with asperities, which characterize this genus.

Sp. 1.—*E. hominis*.—*Character*. Body pyriform, retracted towards the part where it adheres to the common bladder, one row of hooks on the head.

This species of hydatid was first found by M. Meckel, and afterwards by Zeder, in the brain of a young woman. They were about twelve in number, and occupied the third and fourth ventricles.

Of the nature and effects of these hydatids in the human body little is yet known, their characteristic distinctions having been more an object of enquiry amongst naturalists than pathologists. Dr. Hunter has remarked, as Hartmann, Tyson, and Pallas had done before, that hydatids taken from a sheep (the *cysticercus tenuicollis*) even twelve and fourteen hours after the animal had been killed, moved briskly with a kind of peristaltic motion over the whole body, on immersion in hot water; and Sir Everard Home states that in a similar experiment made by himself, he witnessed a very evident contraction and relaxation of their bodies, with a brisk undulation of the circumambient fluid, which continued for half an hour, and exactly resembled the action of muscles in more perfect animals.* The author last named submitted animalcules of the same kind to examination with microscopical glasses of a high magnifying power, but was unable to detect any appearance of muscular structure: he remarked, however, that their coats resembled paper made upon a wire frame, and, as this structure does not belong to membranes in general, considered it to be the organization upon which their motions depend.†

Observations are wholly wanting as to the particular effects on the human body of those hydatids already described, and stated to have been occasionally found in it; but it is probable that their morbid agency must nearly correspond to that of any foreign body situated in the same cavity or structure. During life, unless when they are evacuated either naturally or artificially, there appear to be no means of ascertaining that their particular presence is the cause of, constitutional disorder, even though, as when they occur within the cranium, it may be severe and irremediable. Under such circumstances therapeutic attention can be directed only on general principles to the relief of sympathetic disorder, and to the maintenance, as far as possible, of the due functions of the abdominal viscera.

Some of the inferior animals, particularly sheep, often become the subjects of disease in which the *H. cysticerci* are generated. A cachectic state of the body followed by abdominal dropsy, commonly described under the vague and indefinite term *rot*, are the conditions with which their occurrence is most usually observed. Co-existent with them are frequently found pervading the liver and in its ducts great numbers of the flat vesicular worm named *fluke*, *fasciola hepatica*: the small intestines are at the same time blackish, and easily lacerable, and the glands of the mesen-

* Croonian Lect. Lond. 1795.

† Ibid.

tery enlarged and indurated; purulent tubercles and cysts containing transparent fluid are also observed to pervade the lungs. Hydatids of the same kind are apt also to be generated within the crania of these animals, giving rise to that singular affection commonly called gid or staggers, from the particular effect produced on their locomotive powers: their precise situation in this cavity has been frequently discovered by the effects produced on particular nerves and the action of those parts under their influence, indications which have sometimes led to their extraction, to the perfect relief of the suffering animals. Wet seasons, variable temperatures, and watery pasturage, are the causes to which the occurrence of rot in sheep, and consequently hydatids, are usually attributed; and Dr. Jenner has proved, by direct experiments made upon rabbits, that the same animalcules could be produced at will by feeding them solely on green succulent food.* The production of hydatids in these instances is probably consequent to the general disease induced in the constitution, and its restoration to a healthy state in sheep is often successfully attempted by removing them to a dry and sheltered pasturage, with the exhibition at the same time of muriate of soda, considered the safest and most effectual of all the remedies of this distemper. To relieve the hydropic state of the body which accompanies it, diuretics are given, and it is from their diuretic action, we presume, that fox-glove and spirits of turpentine have been much extolled. Broom, heather, elecampane, and coltsfoot are also popular; and tonic medicines, such as the preparations of iron, have been highly recommended by those who have had the care of sheep thus diseased. How far medicines of the same kind may be useful in the human subject under circumstances apparently similar, we shall not pretend to determine; but direct experience having failed to supply the requisite information, some hints of practical advantage may be derived from analogy.

The second division of our subject refers to one distinct kind of hydatid which very commonly occurs in the human body, and is a simple bladder more or less transparent, without any visible fibres or other traces in its organization of animalcular life. It has been considered, however, from some phenomena presently to be noticed, of the same nature as the hydatids already described, and has been classed with them under a name proposed by Laennec, viz., *hydatid acephalocystis*, derived from the Greek words *α, priv.* κεφαλή, *caput*, and κύστις, *vesica*.

The shape of the acephalocyst is uniformly round or oval, and in size they vary from the smallest perceptible through every gradation to that of several inches in circumference. Their coats are translucent and composed of a white semi-opaque pulpy matter, separable into two layers of variable thickness in the same as well as in different specimens. The fluid they contain

is clear and transparent like water, but occasionally of a yellowish or amber hue; but their most distinguishing characteristics are, that they are always found unattached to each other or to the cyst in which they are included, together with a fluid very variable in its nature, sometimes consisting of serum, at others of serum mixed with blood, or pus, or both; occasionally of pus only, and now and then of a fluid which has the appearance of dirty water with chalk diffused through it; and it is remarkable that, whatever it may be, it does not affect the contents of the acephalocysts, a fact which has been considered indicative of an assimilative function proper to their tunics, and hence to favour the hypothesis of their animalcular nature. The acephalocyst is sometimes solitary, but in most instances a great number of them are found in the same cyst or sac: the latter is usually of a firm texture, formed of condensed cellular membrane, and consisting of two laminæ, the outer of which is strongest and thickest; the inner tender, soft, and pulpy; but together they have a strong contractile power, and have been observed on incision forcibly to protrude their contents. These sacs are sometimes fibrous in their texture, fibro-cartilaginous, cartilaginous, and even occasionally osseous. When acephalocysts, immediately after removal from the body, have been partially divided with a knife, the cut edges have been observed to be immediately incurvated, a circumstance which has been considered indicative of animal contractility. Adhering to the inner surface of a small proportion of them, several minute vesicles are to be seen, which have the appearance of so many pearls or studs; but examined with a microscope, they were noticed by Hunter to be merely sessile on the tunic, and to be covered by a thin transparent membrane, so as to be interposed as it were between the two. These he considered to be young hydatids, an opinion which Laennec amongst other pathologists also entertains; and that the numerous vesicles, observable with a microscope diffused throughout the fluid of acephalocysts, are of the same nature. They have been noticed in every variety of size, from the two-hundredth part of an inch in diameter to that of a red globule of blood, and even less; and the coats of the largest to be a little rough, with numerous filaments or villi, which, examined with a deeper magnifier, presented somewhat of a mulberry appearance. "It is not improbable," says Hunter, "that the small globules attach themselves by the villi to the side of the hydatid and to each other, and thereby give the appearance of being covered by a thin membrane. However that may be, the globules being found of various sizes floating in the liquor, seems to prove that they are originally formed there, and not in the coats of the hydatid upon which they are afterwards deposited."

To proceed with the graphic description of the same writer: "The hydatids in their growth and decay appear to pass through various stages; they are first found floating in

* See Inquiry into the Nature of tuberculated Accretions. By John Barton, M.D. 8vo. 1819, p. 96.

the fluid that fills the hydatid, and afterwards attached to its coats. The hydatid thus pregnant with young, if the expression may be allowed, adheres to the neighbouring parts, increases in size, and becomes itself a sac, containing numerous small hydatids. These after a certain time decay, and the skins or empty bags are squeezed together into a substance like isinglass. It is probable they still undergo a further change; two small bodies of the size of a common bean, of a cheese-like consistence, and covered with a skin, were taken notice of adhering to the bladder near its neck," in a human subject, in whom the bodies now described were found between the rectum and the organ just mentioned. "It may be a question whether those were not the remains of hydatids; but that must be determined by future observations. It is to be observed that the young hydatids are found in two very different stages; in the one they are attached to the coats of an hydatid that floats loose in the parent bag or sac; in the other extremely small globules adhere slightly to the inner surface of a bag or sac, which is firmly attached to the neighbouring parts, and covered with a strong outer coat. It is obvious that the progress of growth is very unequal in these two, and, indeed, inverted; for in the first the young ones are as large as the heads of pins, while the parent bag is not larger than a walnut, and floats unattached; but, on the contrary, in the second there is a large sac, with a strong outer coat, and a more tender inner one, adhering strongly to the surrounding parts, while the young ones that are very slightly attached to its sides are not of a larger diameter than a two hundredth part of an inch." Besides the small transparent vesicles already described, Laennec has remarked that on the exterior as well as interior surfaces of acephalocysts, some small prominences (*bourgeons*) of irregular form and variable size are presented to notice. These, we presume, correspond to the mulberry appearance adverted to by Hunter, and are considered by the former distinguished pathologist as nascent hydatids, which in a certain state of growth are detached, the interior increasing the number in the fluid of the acephalocyst, and those from the outside forming so many distinct and separate hydatids in the surrounding fluid. In some instances hydatids (probably of this kind) are stated to have been included in succession to the number of three or four, with the fluid proper to them interposed between the several layers, the last being distended in the usual manner of single hydatids. An illustrative specimen in a state of transformation, that appeared in the examination of a human body which came under his notice, has been described by Dr. Baron; at least such is our inference from the statement that its section exhibited a series of concentric laminæ, resembling very much the appearance of a urinary calculus.* Another instance of the same kind is related by Sir Astley Cooper in his valuable work on Diseases of the Breast,

page 41. Their appearance is thus described: when opened, they were found to be composed of numerous lamellæ, like the crystalline humour of the eye, or like the layers in the onion, which could be readily peeled from each other.

Acephalocysts have been found in almost every structure and cavity of the human body, but particularly in the liver, the uterus, the kidneys, and cellular tissue; they have been ejected in considerable numbers from the stomach by vomiting, and downwards from the intestines; brought up from the lungs by coughing, voided with the urine, and discharged from tumours in various parts of the body. Pallas seems to allude to their occurrence in the lungs and liver of the ox tribe and other ruminating animals, and Laennec has noticed their presence in sheep.

From the period of Tyson's publication already alluded to, it has been a question which refers particularly to the hydatids we are now considering, whether they are distinct members of the animal kingdom. We have cited pathologists of the highest repute who have supported this hypothesis, and it must be acknowledged that it has obtained an extensive credit; it behoves us, however, to examine the ground on which it is founded, believing, as we have reason to do, that the greatest misconception exists as to the nature of these bodies. Our knowledge of the structure of the acephalocyst has afforded no inference favourable to the conclusion, nor can we recognize any evidence of it in the retraction which is said to take place in its cut edges when divided, such being a phenomenon of mere organic life, and their incurvation an effect which would be mechanically caused in any spherical membranous bag distended with fluid under similar circumstances. Proof has been further sought, but found wanting, on the immersion of acephalocysts in hot water, no contraction having been evinced in obedience to this stimulus, which, as already stated, has occurred most obviously when the *H. cysticerci* have been the subjects of the same experiment. Baillie* and Monro,† as well as Hunter,‡ contend that this failure in the anticipated result may depend on the hydatids (acephalocysts) having been allowed to remain a longer time in the dead body before examination than would be compatible with their vitality, supposing them to be possessed of it; Dr. Monro has also stated that purulent matter proves fatal to hydatids, but if applied to acephalocysts, the assertion involves a *petitio principii* unsupported by facts. It must be admitted that there are phenomena in their economy difficult to be accounted for, from which arguments in favour of their animalcular nature have been advanced: these we shall mention seriatim. 1. Their original production; 2. their growth and increase, without any vascular continuation with surrounding structures; 3. the unvarying identity of their fluid contents under the diver-

* Morbid Anat. vol. ii. p. 205.

† Morbid Anat. of the Gullet, p. 256.

‡ Medico-Chir. Trans. vol. i.

* See Dr. Baron's Inquiry, p. 95.

sified media of that by which they are found surrounded; lastly, their inclusion, or, as it has been termed, the generation, of others often found in considerable numbers and different sizes within them.

The earliest hypothesis which appears to us to refer to the origin of the particular kind of hydatids now under discussion, ascribes their formation to an altered state of the lymphatics, suggested probably by a resemblance of the fluid proper to them to the usual contents of these bodies. It was supposed that on any accidental impediment to the transit of the lymph, the valvular structure of these vessels would prevent its reflux, and necessarily occasion a distention of its parietes between the obstructed portion and the valve immediately above it; and that, from their natural approximation to each other, a successive distention would ensue, giving rise to an adhesive apposition, or to a complete separation of them in the spherical form of the hydatids now called acephalocysts. This view of their formation seems to have originated with the celebrated anatomist Bartholine, afterwards to have been disseminated by Wharton and Nuck, and to have been generally adopted until their promotion, on the score of analogy, from the rank of inanimate to that of animated bodies.

If it be admitted that acephalocysts are animalcules, their origin must necessarily be involved in all the obscurity which envelopes the subject of generation in the lowest grade of insects, rendered still more incomprehensible by their natural localities in the bodies of men as well as of the inferior animals, unless, indeed, it be accounted for by the following general explanation, given us by Andral, which, to say the least, deserves considerate attention: "Besides the clot of extravasated blood which, by the experiments of Hunter and Home, has been proved susceptible of organization, it not unfrequently happens," says Andral, "that under the influence of causes more or less appreciable, the fibrine, either alone or accompanied with a considerable proportion of colouring matter, abandons the blood, and escaping from the vessels by some morbid process, finds its way into the adjacent tissues, as is proved to demonstration in the cavities lined by serous membranes. The fluid containing these is not unfrequently found to exhibit certain fibrinous concretions presenting evident marks of incipient organization; and of the same nature, though in a more advanced stage, may the transparent cysts now under discussion be considered, the formation taking place just in the same manner as the coagulum of fibrine, at first an amorphous mass, becomes vascular and organized." As successive links in the chain are placed "the cysticerci and other hydatids in their progressively complicated forms, and next to these the flattened worms, in which the characters of animal life become much better marked, by the manifestation of unequivocal movements, and by the appearance of different organs as distinct and as well formed as those of the vertebrated animals. In this way we pass by regular and almost insensible

gradations from the simple clot of fibrine deposited in a serous cavity, to the strongylus or the ascaris lumbricoides; just as during the formation of the embryo we observe it gradually advancing from the state in which it exists as a homogeneous mass, devoid of form or texture, until it acquires all the organs of a perfect animal; and as in the series of animated nature we can trace the development and progress of life and organization from the green matter of vegetables up to man. It appears to me perfectly futile to attempt fixing the point in this series of transformations where what is called animal life commences. If we give the name of animal to the cyst which floats loose in a serous cavity, and is moreover provided with vessels, and if we consent to admit the animal existence of this clot of fibrine, where are we to stop, or where draw the line of demarcation? If we admit to the rank of animal every aggregate of matter which, being developed in the interior of a being endowed with life, is capable of supporting itself, and of increasing in size without having any connexion with that being, the serous cysts already described must then be considered as animals, and accordingly they have been described as such by Laennec. But if we only recognize as animals those bodies which present some trace of sensibility or mobility, these cysts then forfeit all claims to that title; so that, in fact, this much agitated question turns out to be a mere dispute of words, which can never be finally adjusted until the contending parties shall agree in their definition of what it is which essentially constitutes an animal."*

The growth of the acephalocyst, it is evident, depends on some property inherent in its membranous portion, whereby it is fitted to appropriate to itself from the surrounding medium the particular fluid proper to it. The process appears to be analogous to that of secretion in serous membranes; but in the latter it must be remembered that red blood is the immediate pabulum of the secretions, whereas in the present instance it is a fluid which has already been eliminated from it; a circumstance certainly favourable to the hypothesis of the parasitic nature of acephalocysts, but which nevertheless may be referred to the mechanical process of imbibition, a property belonging, there can be little doubt, to the serous as well as other membranes of animal bodies.

The third division of our subject embraces the simple pellucid vesicles commonly called false hydatids, which are found either partially or wholly in contact with the adjacent tissues, and are supplied directly through them with the fluid by which they are sustained and their growths increased. As they have been usually adverted to in medical writings, they consist either of perfect bladders, capable of being detached without lesion of structure, or else are, as it were, diverticula from the sub-jacent membranous expansions, from which they could not be separated at their bases with-

* Vide Treatise on Pathol. Anat. Transl. vol. i. p. 477.

out laceration of a part essential to the integrity of one or the other. The manner in which the former are produced is a question yet undetermined, but the following explanation seems to us to be consistent with the knowledge we possess on the subject: that under particular conditions of the system, either general or local, there takes place a deposition of serous fluid, which accumulates in proportion to the distensible nature of the part; but according as the latter is more resistant, an increase of pressure ensues, serving to condense the surrounding cellular membrane into a corresponding envelope, and thus to present an entire cyst. Bichat, however, contends that the formation of the cyst takes place prior to the deposit of the fluid, which, though scanty at first, increases with its growth, and that it is first developed in the filamentous tissue, according to laws analogous to those of the growth of parts in general, to be referred, in his view, to unknown aberrations or unnatural application of those laws. He argues thus against the explanation previously advanced: "1. That cysts are analogous in all respects to serous membranes, and should therefore have the same origin; 2. that the mechanical hypothesis of their origin, in which all the vessels ought to be obliterated, does not accord with the exhaling and absorbing function of cysts, nor with the mode of inflammation; 3. that if these sacs are formed by the mutual application and agglutination or adhesion of cells, (that is, of the filaments,) the contiguous tissue ought to be diminished, or to disappear when they are bulky, which is not observed to take place; 4. that if cysts are formed by condensation of the filamentous tissue, and if their fluid is effused by exhalation, this fluid ought to exist in the organ which separates them from the blood."*

The second kind are produced by the distention of the interstices of the particular structures or of natural cavities with effused deposits of fluid, and vary, therefore, in nature, according to the texture of the parts in which they are situated, the quality of the fluid being determined anterior to its separation from its depositing vessels. It is, we presume, to cysts of this kind, under the denomination of hydatids, that Boerhaave and Haller have ascribed an origin in the follicles of glandular structures; which Monro has treated of as an alteration of the cellular membrane; and in like manner Portal and Broussais as the result of a chronic inflammation of the capillaries which convey the blood deprived of its colouring matter to the cellular membrane interposed between the serous and other textures. Single cysts of this kind are sometimes met with, but frequently they grow in clusters, and resemble bunches of grapes; sometimes they are thickly set on a broad surface, and present a honey-comb appearance; occasionally they are found adhering to each other at their sides, and when crowded on the superficies of an

organ having a cavity, or when produced in the same manner from the internal surface of another cyst, they occasionally lose their organic vitality in consequence of pressure at their pedunculated extremities. When single, they sometimes have broad bases, not unlike the vesications produced by a blister plaster, or boiling water, which might with as much reason be called hydatids as the cysts to which we now refer. The contents of these cysts as to quantity vary in every gradation from a single drop even to several pints of fluid, and are found also to differ in nature, being frequently clear, like water, often resembling serum mixed with blood, and occasionally purulent. To cysts of this kind recent pathologists have applied the term *hydroma*. Examples of it are often found in the female ovary, in which they vary much in size, and also in the colour and consistence of their contents from mere serum, with more or less of albumen, to reddish, bloody, or even tar-like fluid. Their appearance, it is probable, may depend on an altered condition of a particular part, as they have been frequently witnessed in bodies free from disease; but they are often the result of a hydropic state, which is general, when they appear to be produced under circumstances precisely corresponding to those of dropsy. Hence from an early period after the discovery of the lymphatics, their occurrence has been attributed to a morbid condition of this system of vessels; and though the links in the chain of their causes have never been distinctly traced, experience seems to prove that a cachectic state most commonly predisposes to their formation. Although frequently connected with disease which is irremediable, they are in themselves void of all malignant tendency; and their influential action on the organic functions seems to be limited to the degree of pressure occasioned by their presence and the nature of the organ in which they are situated.

An hypothesis has been promulgated by Dr. Baron, that the hydatid or vesicular form is the primitive state of the tuberculous and other morbid formations, as the strumous, scirrhus, sarcomatous, steatomatous, and fungous. The period at which these transformations take place he states is very uncertain; that they may commence in a few days after the hydatid is brought into existence, or that they may not occur at all, the original structure continuing for many years. The occasional co-existence of hydatids with such morbid changes is consistent with general observation, and is confirmed by the undoubted testimony of several pathologists cited by Dr. Baron. Proof, however, is wanting, that the one state is commonly consequent to the other; and supposing the elementary particles of such morbid growths to be deposited in a state of fluidity, we see no reason why they should be regarded as hydatids. On the same principles we conceive, might every globule of blood or every collection of fluid be similarly classed, and thus the real nature of the product be lost sight of in the extension of a term already too

* Elements of Pathol. Anat. by David Craigie, M.D. 8vo. edit. p. 52.

vague and indefinite. Moreover it seems very improbable that morbid products arising under a diversity of constitutional circumstances, and manifested by appearances as well as producing effects as different, should at any intermediate stage evince a perfect identity of character.

To Dr. Baron's work, however, we refer for the full elucidation of his views, which could not be transferred to this place without obliging us unreasonably to exceed the necessary limits of this article; and we do so with the less reluctance, because, whatever may be the reader's conclusion, he cannot fail to benefit by the consideration of the facts and reasoning with which Dr. Baron has supported his positions.

It has been already stated that hydatids have been found in most of the structures of the human body;* we shall now proceed to the practical consideration of them according to their several localities.

Hydatids in the brain.—The presence of animalcular hydatids in the human brain has been rarely noticed, but the occurrence of cysts under this denomination has been very frequently referred to by medical writers. Their real nature it is impossible to determine during life, but their effects are found to be similar to those from any other foreign bodies in the same structures, passing on from those of nervous irritations to the partial impediment and abolition of the functions of the parts under their influence, and ultimately in most instances, it is to be feared, to death.

An instructive illustration has been given to us by Dr. Abercrombie in the following case submitted to him by Mr. Headington:—A boy, aged eleven, was suddenly attacked

with dimness of sight, amounting to blindness. It went off in a few minutes; but from that time his sight was gradually impaired, and after a year nearly lost. He then had an affection resembling chorea, and after a short time suffered an attack in which he lay speechless for three days. This was followed by hemiplegia of the right side. He complained much of his head, which appeared to his friends to enlarge, and he sometimes lost his speech for two or three days. His intellect was not affected, but at times extremely acute. He died, after coma of five weeks continuance, about a year after the attack of hemiplegia, and two years from the commencement of the disease.

Dissection.—On the surface of the left hemisphere, the membranes adhered firmly to the surface of the brain for some extent on the middle lobe. On raising them at this place fluid escaped in great quantity, and on further examination it was found to have been discharged from the cyst of an immense *hydatid*, which was seated in the left lateral ventricle, and had gradually advanced to the circumference of the brain. It contained about sixteen ounces of limpid fluid, and besides these there were several ounces in the proper cavity of the ventricle.*

In an examination of the brain of a man who died on the fifteenth day of synochus, we discovered not long since a pellucid cyst, full of transparent, yellowish, limpid fluid, lying close to the base of the brain at the side of the tuber annulare. Its size was that of a plover's egg, but during life there were no particular symptoms to indicate the presence of such a body. It would be to little purpose to go on enumerating similar instances of morbid formation. We refer, therefore, to the several works on general pathology, especially to those of Bonetus and Morgagni, and to the very valuable work entitled *Elements of Pathology*, recently published by Dr. Craigie, in which (page 477) references are given to several remarkable instances of similar encysted bodies found within the cavity of the cranium, and imbedded in the substance or cavities of the brain.

It is obvious that medical treatment under such circumstances must be limited to the relief of the organ oppressed, and to the suitable regulation of the functions of those which, primarily influenced by external agents, exert a corresponding action upon it. The means of effecting these objects could not be defined for general application, even if the cause of the existent disease were ascertained; but latent as it must be, alleviation of the consequent symptoms can be rationally attempted only by a reference to the general principles of therapeutics.

Hydatids in the thorax.—The lungs, though not often the nidus of hydatids, have occasionally been found to contain them; and instances are related of acephalocysts having

* Experiments on the nature of the fluid constituent of hydatids have not been sufficiently numerous and diversified to determine how far our knowledge of the subject may be advanced by the aid of chemistry. Dr. Marcet, in "an account of various dropical fluids" (*Med. Chir. Trans.* vol. ii. p. 373.) has thus described his analysis. "A quantity of this fluid was procured from a hydatid attached to the kidney of a woman, whose body was opened by Mr. Cooper and myself at Guy's Hospital. It was clear and transparent, though of a yellowish colour. No coagulum or turbidness appeared on adding dilute sulphuric or muriatic acid, but concentrated muriatic acid produced a milkiness. Infusion of galls and oxy muriate of mercury occasioned precipitates. Heat did not produce any coagulation except after very considerable concentration. The specific gravity of this fluid was not ascertained, but a thousand grains of it being evaporated to dryness, at a temperature not exceeding 180°, the residue weighed thirty-six grains, and yielded by incineration a saline mass weighing 8.7 grains. This saline mass contained the usual ingredients; namely, muriate of soda crystallized chiefly in octohedrons, phosphate of iron and of lime, and a small portion of sulphuric acid. Upon the whole, this fluid, which was examined long since, and with much less minuteness than the other, appears to resemble much in its chemical composition that of hydrocephalus and spina bifida, only containing a larger proportion of animal matter, which appeared to be chiefly of the muco-extractive kind, since it did not coagulate by heat or gelatinize by cold or concentration."

* *Researches on the Pathology of the Brain*, by John Abercrombie, M.D. Part iv. Case 29.

been ejected from this organ by coughing. Their presence usually excites considerable irritation, and gives rise to cough, pain, dyspnoea, and quickness of pulse; but we are unacquainted with any particular symptoms by which their existence here could be positively ascertained. A case in which their expulsion from the lungs was followed by complete recovery has been recorded by Dr. Doubleday, in the fifth volume of the *Medical Observations and Enquiries*, by a Society of Physicians in London, 1779, and another by Dr. Monro, unattended with any pulmonary symptoms except that of pain on the right side of the chest behind the mamma, and which was not relieved by bleeding or the application of a blister. In this particular instance there was no sense of oppression nor difficulty of breathing, nor any alteration in the state of the pulse, and the patient could sleep on either side or on his back. By coughing he was relieved of portions of hydatids, and also of some entire, varying from the size of a hazel to that of a walnut, and in quantities amounting at times to as much as would fill a pint measure. The larger hydatids contained a fluid which was clear and viscid; in the smaller it was of a yellow hue and reported to have been bitter to the taste. A few days before their ejection the patient suffered very acute pain in the breast, which he compared to that of the penetration of a pointed instrument. The previous fits of coughing were violent and attended with paroxysms threatening suffocation, which continued for two or three minutes. These effects were first manifested when the patient was fourteen years of age, and occurred at intervals for seventeen years, when at length he was attended by the present Dr. Monro and his father. Having been recommended to smoke tobacco and to inhale the fumes as deep as he could into the chest, the symptoms appeared to be arrested, and for the following eight years he was known to have remained free from any return of the disorder.*

Instances are on record of hydatids having occasionally passed through morbid perforations in the diaphragm into the thorax. In the first volume of the *London Medical Communications*, we read an account of a post-mortem examination in which "a common cyst found to contain a quantity of them, and attached to the liver, omentum, mesentery, and peritoneum, passed through a perforation in the diaphragm; from thence expanding again, it adhered to the pleura and mediastinum, filled almost the whole of the left cavity of the thorax, and communicated in several places with the lungs, which were ulcerated. Had the patient lived long enough, it is possible that hydatids would have been coughed up, as one of the openings from the cyst into the lungs was large enough to admit a goose-quill." In the substance of the liver, which weighed sixteen pounds and a half, another large cyst

was found. A similar case is related in the *Edinburgh Medical and Surgical Journal*, vol. ii. p. 170, in which "an immense cyst occupying the whole cavity of the abdomen" was found after death connected to the mesentery. It was distended to the utmost, and contained thirty-five pints of hydatids, many of them exceeding the largest oranges in size. In both these cases the disease was supposed to be common ascites during life, and in both a fruitless attempt was made to draw off the fluid by tapping. An instance somewhat analogous has been recorded by Dr. Collet,* in which hydatids, originally lodged within the liver, were discharged by coughing: the patient, a female aged thirty-seven, "first complained of lowness of spirits and of an oppression on her breath," followed by some œdema of the ankles, which, however, soon disappeared. A violent cough, attended with great dyspnoea, and the occasional expectoration of tough viscid phlegm, soon followed, and the subsequent ejection by coughing of hydatids at different periods in the course of six months, amounting to the number of one hundred and thirty-five: these varied from the size of a pea to that of a pullet's egg, and were in their ruptured state, no water either accompanying or following them: there had been a swelling at the umbilicus evidently containing fluid, and distention of the whole abdomen, which in parts communicated to the hand of the examiner the sensation of lumps; these, however, had disappeared, and the case promised a favourable issue. Another instance of the same kind is related in the *London Medical Journal*, vol. vi. p. 593, 1785. A lady, during an illness, which continued more or less for three years, "coughed up several hundreds of hydatids, most of which were burst, and of these many must have been as large as a pullet's egg: those which were not burst were only about the size of a nutmeg. This patient was considered dropsical, and to have disease of the liver: she, however, recovered her health.

It is probable that the bronchi are very rarely if ever the original seat of hydatids, but that they are passed into their ramifications from the parenchyma of the lungs and the pleura, or from other structures, as in the cases above related; but, under whatever circumstances, we may generally anticipate recovery if their expulsion through this channel has commenced, provided that other disease be not co-existent, when of course the probabilities of the issue must depend on the nature and circumstances of the latter, and the remedial means be applied accordingly.

"Although," says Andral, "instances are not uncommon of animalculæ having been found in the vascular system of quadrupeds, I know only of a single occurrence of this nature in the human body." The subject was examined by himself at La Charité. "I found

* See *Morbid Anatomy of the Human Gullet*, by Alexander Monro, M.D. 8vo. edit. 1811. p. 279.

* *Transactions of the College of Physicians*, Lond. vol. ii.

both lungs," he writes, "filled with hydatids, and thought that these *entozoaires* were lodged in the parenchyma of the lungs; but a more close examination disclosed the existence of hydatids in the pulmonary veins of both lungs. They had all the characters of accephalocysts. Around them the pulmonary tissue was in some places sound and crepitating; in others obstructed and hepatized. An hydatiferous cyst, with cartilaginous parietes as large as an orange, existed in the middle of the liver, and contained from eight to ten hydatids. The individual who was the subject of this case was fifty-five years of age, for a year previously had been ill-fed, and often experienced considerable distress. The symptoms of an aneurism of the aorta under which he laboured were the object of therapeutic attention during life; and from the post-mortem examination, the latter appeared to be the effect of impeded circulation, consequent to the presence of hydatids in the pulmonary veins."*

Hydatids in the abdomen.—Hydatids have been frequently found in the several viscera of the abdomen, occasionally attached to the peritoneum, and sometimes loose, either between it and the abdominal muscles, or amongst the viscera themselves.

Except the kidneys, the liver is more frequently affected with hydatids than any other organ, and in sheep as well as in some other quadrupeds under the particular circumstances of wet seasons and marshy pasturage, this appearance of disease is apt to prevail very extensively. In the human species corresponding causes have not been observed to influence their formation, although there is reason to believe that a cachectic state of body has been conducive to it. Symptoms of a disordered liver to a greater or less extent are usually present; occasionally the same effect is produced as when a calculus is passing through the gall-ducts, viz. violent spasmodic pain at the epigastrium, frequent vomiting, with an unaccelerated pulse, and sometimes jaundice alternating with intervals of good health.

When hydatids are confined within the substance of the liver, there appear to be no means of ascertaining their existence; but when formed on its outer surface near its lower edge, it is probable that they may be detected by examination. When, however, the parietes of the abdomen are thick, and hydatids or their cysts not distinct, but lying in contact with each other and making an irregular tumour, it will hardly be possible to form an accurate opinion of their nature. If the tumour be gradually formed, and the general health little affected, it is probable that hydatids may be the cause. Close attention to the sensation which the tumour yields on pressure or on striking it gently with the hand, may also assist in enabling the examiner to form a probable idea as to its nature. If it should con-

sist of hydatids, it will generally feel to a certain degree soft; and if the hydatids should be very large, there may be an obscure sense of fluctuation on striking the tumour with one hand while the other is applied to the opposite side of it. If, moreover, it should occupy a great part of the cavity of the abdomen, and can be clearly traced from the liver as the source of its growth, there can be little doubt of hydatids being the cause.*

Some instances have already been referred to in which hydatids had passed through a perforation in the diaphragm from the abdomen, and were ejected by coughing from the lungs: they have occasionally also been evacuated from abscesses, and sometimes from the abdomen with the fluid discharged by tapping; in the former most frequently to the complete relief of the patient. The circumstances under which they thus occur being variable, preclude any specific character being given of them, and therefore must be illustrated by example. A female was treated with mercury under the supposition that hepatitis and consequent suppuration in the liver had taken place. In about ten days the mercury began to affect her mouth, and at the same time she voided an incredible quantity of the *tæniæ hydatigenæ*, or hydatids, by stool and vomiting, calculated by her attendants to amount to a thousand, varying in size from that of a small pea to an inch and a half in diameter. An hepatic abscess afterwards opened externally, a gall-stone was discharged from it, and she ultimately recovered.†

An instructive case of the same kind is related by Mr. Gaitskell, of Rotherhithe, in the fourth volume of the London Medical Repository. The patient, a married female aged thirty-eight, had been under treatment for hepatic disorder with inflammatory symptoms, and, a short time after pytalism was induced, began to void biliary calculi, which in three months amounted to forty-seven in number, and with them hydatids not less than a thousand, varying from the size of a grape to that of a peach. At the date of the report the patient was convalescent.

An example of fatality occasioned by a sac of hydatids situated in the porta of the liver, which by its pressure on the vessels produced complete obstruction and jaundice, is related by Dr. Duncan, Sen. in the Edinburgh Medical and Surgical Journal, vol. iv. p. 137.

Hydatids which are ejected from the stomach or discharged from the alvine canal, have in most instances been generated in the liver, but occasionally it is probable that they have passed from their common sac in consequence of its adhesions to, and resulting communication with, some part of this tube: they may be transferred in the same manner, we conceive, from the other abdominal viscera, but having found an exit through this channel,

* Andral's Pathol. Anat. Trans. vol. ii. p. 424; and Med. Repos. vol. xix. p. 347.

* See Works of Mathew Baillie, M.D. vol. ii. p. 212.

† Lond. Med. Journ. vol. x. p. 7. 1789.

recovery so commonly ensues that the opportunity of proving the truth of the remark by ocular inspection can rarely occur, nor can we adduce any such positive testimony in support of it.

From the co-existent disease, rather than from the presence of hydatids in the liver, the judgment of the practitioner must be formed as to the issue; and the requisite treatment of the patient must necessarily be influenced by the same circumstances. The hepatic disorder will generally be such as to render the exhibition of mercury necessary, and the stimulating effect of this remedy on the absorbent system renders its use, at all events externally, of considerable importance in the removal of hydatids, whether situated in the liver or in any other of the abdominal viscera.

The presence of hydatids in the spleen is an occurrence which has not often been noticed: during life the symptoms occasioned by them in this organ are too obscure to be recognized, and can never become the specific object of medical treatment. We shall subjoin a remarkable case of this kind in preference to any discussion which we cannot find on experience.

"A labourer, thirty years of age, of a phlegmatic habit, after lifting a heavy load, complained of pain in the chest, accompanied with cough and much debility. Two months afterwards his legs began to swell; he spat blood twice, a little at a time, which degenerated into a purulent expectoration of a bitter taste. He now applied for medical assistance, under the idea of his disorder being the first stage of a pulmonary consumption. His pectoral sufferings abated, but the œdema increased, and the parts became erysipelatous, but soon changed their colour again on the application of dry aromatic fomentations; and the œdema subsiding on using twice antihydrotic medicines, the patient thought himself cured. A short time after, however, when he had been at hard labour, the spitting of blood returned, and he complained of stitching pains in the chest; the scrotum was swelled, the pulse very slow, and digestion disturbed. These symptoms were also attended with headach. The pectoral sufferings were again soon removed, but the dropsical swelling remained, and a painful, hard, circumscribed tumour, beginning in the left hypochondrium, and extending upwards to the xiphoid cartilage, now made its appearance, which, with the obstinacy of the dropsical swelling, induced Dr. R. to make use of drastic medicines. An abscess now formed over the right knee, which effused a considerable deal of ichor; but the dropsy increased, and the patient at last died suddenly after a long ambiguous state of health.

"*Dissection.*—The greatest mark of disease was found in the spleen, which was unusually distended, and weighed about nine pounds; and a tendinous place was found in its centre, about the size of a hand, from which, on being

cut open, a great quantity of water escaped, with a number of globular vesicles, varying in size from that of a millet-grain to that of a duck-egg, containing partly a clear liquid and partly a friable substance, which by the help of a magnifying glass exhibited other small vesicles. Many of them were burst asunder and dried away. The bag containing these bladders divided the disorganized spleen into two halves, formed by an aponeurotic membrane, from half a line to two lines in thickness, interwoven with the substance of the viscus, and furnished with very swollen blood-vessels. It ran obliquely through the spleen, so that its larger half lay to the left and upwards, and the smaller to the right and downwards. All the other viscera were healthy, except that some water was contained in cavities caused by serous membranes."*

The pancreas is still more rarely the seat of hydatids than the spleen, and it is probable that their occurrence in this organ can only be ascertained by post-mortem examination.

Of the various organs of the body, the kidneys are more frequently than any other affected with hydatids; these for the most part are simple cysts produced in their peritoneal covering, and on inspection present an appearance resembling bunches of grapes: they may exist to a very considerable extent without manifesting any distinguishing characteristics of their presence during life, and without at all affecting the quantity or sensible qualities of the urine. Sometimes, however, though rarely, acephalocysts have been found to pervade these organs, but no particular symptoms have been evinced to render their presence recognizable during life. Pain is commonly felt in the loins during their formation; there has also been remarked symptomatic fever, nausea, and vomiting, but these are symptoms which belong also to other diseases: they have occasionally, however, been passed through the urethra, and in such instances have sometimes occasioned dysuria from interruption to the passage of the urine, either in the ureters, the neck of the bladder, or in some part of the urethra.†

One or more acephalocysts having been passed with the urine, a continuance or repetition of the precursory symptoms, or the subsequent occurrence of dysuria, will be almost certain indications that others are in their transit; and even if the same symptoms should have been caused by the passage of renal calculi in a subject prone to the latter formation, the treatment during the paroxysm consequent to the obstruction will alike be directed to the relief of an organic channel thrown into a state of spastic contraction in consequence of unnatural distention. The symptoms of acephalocysts in these as in other organs will be variously modified by other disease with which they are almost always connected, particularly,

* Lond. Med. Repos. vol. vi. 1816, p. 332. Extracted from Horn's Journal, 1815.

† Works of Mathew Baillie, M.D. vol. ii. p. 257.

and most frequently perhaps, abscesses following blows or other injuries. On this account, therefore, it seems to us that examples are essential to an intelligible description of the morbid states in which their presence is evinced. We subjoin the following as particularly illustrative of renal acephalocysts.

"A gentleman, aged 32, was thrown from his horse in February 1780, by which he received an injury on the loins, and had considerable hematuria in consequence. After the first fortnight he experienced no further inconvenience until the June following, when he complained of cough attended with bloody expectoration, which he ascribed to the previous accident; but from a little attention he recovered, nor experienced any symptom of his late disorder until about three years afterwards. In December 1783, he was attacked with rigour, and felt a return of severe pain in the loins, extending to the region of the left kidney: in a few days he perceived an enlargement in the hypochondrium, which continued gradually increasing until the latter end of February 1784, a space of nine weeks: after the first month, the tumour was so little painful that the patient was enabled to travel to London, a distance of one hundred and thirty miles, to consult Dr Lettsom, by whom the case is detailed. Upon examination the tumour, which was as large as an "infant's head," was found to contain fluid: it extended from the vertebræ of the back along the left *hypochondrium* to the umbilical region, and occupied the whole space from the ribs to the *os innominatum*. The pain increased with the swelling, and was aggravated by exercise or motion, but was relieved by an anodyne, "till at length some difficulty of making water came on, and for many hours a total obstruction: in this situation surgeons of the first eminence were consulted, to determine how far it would be advisable to make an incision in the side and perforate the cyst, in order to take off the pressure on the bladder, and obviate the fatal event which the retention of urine threatened: this was on the 20th of February; the result was, that, from the uncertainty of the situation of the tumour with respect to the intestines, which were suspected to take a curve over its anterior surface, as well as from the risk of exposing such parts to the external air, the operation was protracted, and the usual opiate of the patient was ordered to be increased in the evening, which was the chief remedy besides the use of cicuta and anodyne clysters. He passed a painful night, suffering frequent and violent rigors, but early in the morning experienced the most happy relief by a discharge of a large quantity of thick pus with the urine, which was followed the next day by that of pus and numerous hydatids.

"In a few days the tumour subsided, and the purulent discharge ceased; after this he continued recruiting in strength for nearly a fortnight, when his side enlarged again after exercise in a coach, probably by a large hydatid

stopping up the ureter; rigors and strangury succeeded as before, and the tumour became as large as in the first instance, till the latter end of March, when he experienced a second discharge in every respect like the former, except that the hydatids were much larger. His health and strength again returned, until his side filled a third time after exercise on horseback, and continued swelling until the 25th of April, when he was again relieved by a third discharge of hydatids, and these were considerably larger than those of the preceding attack. The passages now became so open that he frequently discharged the hydatids, after walking or riding, without enlargement or pain of side; or, if he felt uneasy, or perceived a tendency to tumescence, by pressing his hand upon the side he could squeeze them into the bladder, where they would remain some time before they were discharged; but the hydatids became at length so considerable in size that it was with great difficulty they passed the urethra. The last that he voided was on the 12th day of July, which was so very large that it stopped up the urethra, and remained in it for a considerable time, until the weight of the accumulated urine forced its way. The earliest hydatids burst in their exit; they gradually increased in magnitude in every successive discharge, the first being not larger than a pea, and the last about the size of a pullet's egg. After the last-mentioned discharge his health gradually recovered, and the patient enjoyed, without the least inconvenience, the chase and every other species of exercise as well as ever he did.

"During the whole progress and termination of the disease very little medicine was administered, except cicuta, gum arabic, clysters, and anodynes. He once took an emetic when the tumour became uneasy, previous to the second discharge, and which seemed to hasten the eruption of hydatids. Bark was tried, but with manifest inconvenience, between the eruptions, and was left off. After the last discharge it seemed beneficial, as well as asses' milk."*

From the history of the disease there remains very little doubt but that it originated in the kidney, where the suppuration was extended to an amazing degree, till at length the pus, breaking through the cyst in which it was contained, passed into the ureter, and was thereby conveyed into the bladder.

A temperate man had been for some years subject to paroxysms of pain in the region of the right kidney, which appeared to descend in the course of the ureter of the same side, and ceased after discharging by the urethra some membranous bags (acephalocysts) of different sizes, some whole, but others broken and empty; there were considerable intervals between the paroxysms, during which the patient enjoyed perfect health; but the latter, from recurring every four or five months, had now increased in frequency, and the hydatids in size.

* Memoirs of the Medical Society of London, vol. ii. p. 33. 1789.

The patient had suffered thus for ten years previous to the date of the above report, but at first their discharge was attended with a sense of weight or pressure rather than of pain, preceded sometimes with slight rigors. These discharges, together with purulent matter, at length recurred as often as five times within a twelvemonth, accompanied with increasing pain preceded by a sense of fulness in the region of the right kidney; for three years there was a cessation of the above symptoms reasonably attributed to continued attention for four months to the following prescription of Dr. Lettsom:—

R Extr. cicutæ et pilulæ sapon. aa ʒi. fiant pil. xxiv. cap. ii. omni nocte.

R Elect. lenitiv. ʒi.

Æthiop. mineral. ʒʒ.

Syrupi simpl. q. s. ut fiat elect. de quo cap. magn. nucis mosch. prout venter postulat verit.

R Uvæ ursi ʒiʒʒ. coque ex aq. font. ʒix ad ʒvi. sub finem coctionis addendo rad. glycyrrh. ʒʒ. et cola.

R Liq. colati ʒʒ.

Tinct. stomach. ʒi. fiat haustus bis per diem sumendus.

Three years having elapsed, the report states that after some considerable pain in the back, he voided again several more hydatids, of a longer size than formerly, to the basis of which, or that part which appeared to have been attached to the kidney, some sabulous matter adhered; he discharged several more at different periods, but had experienced such amendment from the use of the same prescription, the powder of uva ursi only having been substituted for the decoction, as to give a fair promise of perfect recovery.*

For another instructive case of the same kind, related by Dr. Alexander Russel, the reader is referred to the third volume of the Medical Observer and Enquirer, published by a Society of Physicians in London, 1767. In this instance the patient retained his health, though at intervals he discharged hydatids with his urine occasionally mixed with purulent matter and streaked with blood; these at first are stated to have been round, "of the size of a common garden pea, with a small stalk." The patient about ten years before, when at school, had experienced "some violent complaints in the urinary passages, when he voided dark coffee-coloured urine with great pain." Dr. Baillie has given us an account of the dissection of a case in which the right kidney of the body of a man who had been a soldier was converted into a bag, capable of containing at least three pints of fluid, full of hydatids (acephalocysts) differing from a pin's head in size to that of an orange, and only a small part of the kidney retained its natural structure.†

When hydatids have been passed into the bladder, irritation to a greater or less degree is excited to propel them with the urine, and it

is probable that the exceedingly thickened state of the parietes of this organ in those in whom they have existed has been occasioned by increase of action, as was suggested by Dr. Baillie in the above mentioned instance. In another related by Tyson the same effect was observed to have been produced: in the latter the cysts or sacs (acephalocysts) were twelve in number, varying from the size of a goose's to that of hen's eggs, and distended the bladder to the size of a child's head, though little or no urine was contained in it: the ureters are stated to have been impervious at their vesical extremities, but distended to the calibre of the intestines of a child, and at their renal extremities to the size of a hen's egg, the kidneys themselves being of their natural size and figure, but resembling rather large bags than fleshy substances: the cavity of the pelvis (whether of one or both kidneys is not stated) contained above three ounces of fluid. The liver, lungs, and heart of this individual were considerably diseased, and polypi were observed in the aorta and pulmonary vein.*

Hydatids have occasionally been found between the bladder and the rectum, as in the case already referred to, which came under the observation of Dr. Hunter,† and had occasioned only the particular symptoms of dysuria and distention of the abdomen: the patient, a man forty-six years of age, died suddenly, and on post-mortem examination the bladder was found to be enormously distended, reaching full eight inches above the pubis, its fundus having risen to within two inches of the arch of the colon; it contained between five and six pints of urine, and the hydatidous tumour was found between the neck of the bladder and rectum, completely filling the pelvis, and thrusting the former forwards and upwards.‡ It was remarked by Dr. Hunter that the prejudicial effects of the hydatids in this case were limited to those of mechanical pressure, and that of the numerous cases related by writers hardly any had proved fatal when an outlet for them was procured.

The peritoneum and its various duplicatures are occasionally the nidus of hydatids, i. e. of acephalocysts and those of the simple encysted kind, but rarely if ever without implication by disease of one or more of the subjacent viscera: it is probable that the development of the hydatids takes place under the different states of cachexy arising from a depressed condition of the vital powers, from the combined circumstances of constitutional diathesis and chronic disease, and not unfrequently are the consequence of inflammation of this membrane taking place under the same circumstances as ascites, with which they are commonly co-existent: the pathognomonic sym-

* Philosophical Transactions, No. 188, p. 332. 1687.

† Dr. Hunter has suggested that they may have escaped from a ruptured orifice of a sac originally formed in the spleen, and passed by simple gravitation into the pelvis.

‡ Medical and Chirurgical Transactions, vol. i. p. 35. 1793.

* Memoirs of the Medical Society of London, vol. ii. p. 43. 1789.

† Morbid Anatomy.

ptoms are thereby rendered extremely obscure, and there appear to be no other means of detecting this morbid process than by manual exploration of the abdomen, and thus only when there is an inequality in the surface, and a partial fluctuation can be perceived on altering the positions of the patient.

The constitutional symptoms complicated with those of the local disease are generally such as to betoken a fatal issue in the human subject, should the real nature of the distention of the abdomen from this cause be ascertained during life; but when the hydatiferous sac is situated between the peritoneum and muscular parietes, adhering to and distending the latter into a tumour, or in fact an abscess as most frequently happens, an artificial opening will be the principal means of relieving the patient; and if this be the only disease, a favourable issue may almost always be anticipated. A sense of unequal fluctuation communicated to the hand of the examiner will be the only method of distinguishing the general nature of this from other tumours; and if the fluid of the common cyst is purulent, it will have the common characteristics of an abscess, the presence of hydatids being concealed until the latter be emptied of its contents, as will generally be the case also, whatever may be the particular nature of the contained fluid. The same observations will apply also to any part of the muscular structure with which formations of this kind may be connected.

Cysts commonly denominated hydatids sometimes constitute the bulk of tumefied ovaria, and are probably formed by the progressive enlargement of the small vesicles which belong to their natural structure: they often acquire an immense size in this organ as well as in the uterus, and vary frequently in their construction, some of the larger cysts enveloping smaller ones, and thus resembling acephalocysts, with which they have not unfrequently been confounded. The inner, however, will be found to be reflected from the outer cysts, like the serous membranes when they are reflected off from the internal parietes of cavities upon the organs contained in them, and to receive from them a continuation of vascular structure; in this respect differing essentially from the isolated state of acephalocysts, and always sufficiently distinctive of the latter kind of vesicular bodies. Though there appears to be no reason why acephalocysts should not constitute ovarian disease, we are not aware of any instances of the kind being on record; and as the preceding morbid condition more properly belongs to ovarian dropsy, and will be discussed under that head, it is not requisite to enlarge upon it here; we have to notice, however, that the suspicion of such an instance in a female forty years of age, who had the symptoms of ovarian dropsy, but attended with more pain than is common in that disease, has been recorded by the present Dr. Monro as occurring within the observation of his father: about a fortnight after the patient had been seen by him, the tumour subsided in the night, and the patient told him "that she

had passed several watery stools with skins in them."*

Hydatids of the uterus constitute a morbid condition of this organ very frequently referred to in medical writings, but it is probable that they are invariably attached cysts, and never acephalocysts. They are described by Bailliet† as vesicles of a round or oval shape, with a narrow stalk to each, by which they adhere on the outside to one another. A large one has generally a number of small hydatids adhering to it by narrow processes, and in the same manner to the uterus by small filaments; and portions of a substance resembling blood and coagulating lymph are frequently mixed with them. A similar substance is attached to the internal part of the uterus, from which the footstalks of the hydatids grow. As these increase in number they distend the uterus in proportion, and at length by their quantity stimulate it to contract upon them. "The cause of this complaint has not been ascertained; it sometimes appears as a morbid condition of the opaque membranes of the ovum; and in such cases, interfering with its functions, it destroys the vitality of that body, and thus produces abortion.

"It is probable that the existence of pregnancy is not necessary for the production of this disease; and perhaps a morbid condition of organized coagulating lymph may, under certain circumstances, have the power of originating it, but what these circumstances are is not known. It may admit of a doubt whether, in consequence of a morbid condition of the ovary, some separation of the corpora Graffiani may not induce the complaint." Hydatids of the uterus, when arising from the destruction of an ovum, are preceded by the symptoms of pregnancy common to the period before this change takes place, and the time when it happens is marked by the breasts becoming flaccid, and the sickness and symptomatic effects of pregnancy going off; but of themselves they do not appear to produce any peculiar symptoms, with the exception of one to be mentioned hereafter. The greater number of inconveniences attending the disease arise out of the pressure made by the enlarged uterus upon the subjacent parts, such as retention of urine from compression of the urethra, constipation of the bowels from compression of the rectum, œdema, and cramp of the lower extremities. These symptoms, however, are not necessarily present, and instances have occurred in which they have been altogether wanting. When the pelvis can no longer contain the enlarged uterus, that viscus will rise into the abdomen, and may be felt as a circumscribed tumour through the parietes.

The function of menstruation is usually interrupted as in pregnancy: on examination the body of the uterus will be found enlarged, and suddenly bulging out from the upper part of the cervix. All these symptoms, however, attend other enlarged states of this organ; but

* *Morbid Anatomy of the Gullet, &c.* by Alexander Monro, M.D. 8vo. Edin. 1811, p. 273.

† *Morbid Anat.*

besides the absence of the movement of a foetus usually felt by a pregnant woman, the size of the belly and state of the womb rarely correspond with the supposed period of pregnancy, and from this condition as well as other diseases it is especially characterized by the discharge of an almost colourless watery fluid. "This watery discharge is to be distinguished from that which attends the cauliflower excrescence, by the irregularity and suddenness of its appearance and cessation; being produced by a rupture of one or more of the coats of these hydatids, in consequence of the occasional contraction of the uterus upon them, or of any sudden violence, as in the act of coughing or sneezing; whereas the discharge from the cauliflower excrescence being a secretion from its surface, is constantly escaping. It may be distinguished also from those splashes of urine which sometimes come away from pregnant women, by being wholly inodorous."

When the uterus is excited to contraction upon hydatids, the process resembles that of incipient labour, for which it has unfortunately been mistaken even by experienced practitioners: "the os uteri is dilated; the hydatids are expelled by periodical pains; and then for the first time danger presents itself in the form of alarming hemorrhage. This hemorrhage is more frightful than that which follows the removal of the placenta from an uncontracted uterus; and the reason is obvious—the placenta covered only a limited space of the internal surface of the uterus, whereas the hydatids spring from every portion of the cavity."* In some cases milk is secreted after the hydatids are expelled, and occasionally pain in the hypogastrium with febrile symptoms follow.

The uterus is sometimes distended by a single hydatid or cyst to an enormous size, but this variety is very rare, for the very experienced author above cited, to whose invaluable work we are most largely indebted for our information on this part of the subject, has stated that such an instance has never come under his observation, and concludes, from the accounts given of it, that its effects are purely mechanical. From the equality and size of the enlargement "it would be difficult to determine whether it were produced by a single hydatid, or by a deposit of solid matter in the substance of the uterus. The fluidity of the contents of the tumour does not necessarily cause a sensible fluctuation of these contents. A full bladder felt above the pubis does not give to the hand the sensation of a fluid being contained within it. The discharge of a watery fluid in large quantities is in this variety of the disease the first announcement of its existence and the presage of its speedy removal.

"The water having escaped, the cyst is expelled, and the disease terminated without the occurrence of those distressing symptoms which threaten the patient's life in the disease first described.

"This last variety being very uncommon,

the practitioner will hardly be prepared for its occurrence, and the patient expecting it to be of long continuance will be agreeably surprised by an expeditious and favourable termination of her complaints.

"Examination by the finger will enable the practitioner readily to distinguish the single hydatid from the more formidable disease, fleshy tubercle; a discrimination of importance in forming the necessary prognosis, though symptoms arising from both forms of disease demand similar modes of relief."

It is probable that distention of this organ by hydatids is the particular condition to which some writers have referred under the term *hydrops uteri*; for it seems impossible from its natural position with respect to its aperture and fundus, that any large accumulation of fluid could take place, and continue for a length of time in it, unless inclosed in a cyst. Such is the expressed opinion of the writer above cited, and that neither he nor Dr. Denman should have witnessed such an instance appears to us evidence almost conclusive.

The presence of a tumour consisting, as suspected, of a bag of hydatids situated between the neck of the uterus and the rectum, has occasionally been found to interfere considerably with the process of parturition, but the nature of its contents it would appear impossible precisely to determine either before or after delivery, unless an opportunity were afforded by a post-mortem examination. A tumour of this kind would occasion little pain in its growth other than that arising from pressure on the surrounding parts, the nature of which would materially depend on its size; but the greatest inconvenience would consist during pregnancy, by its adding to the mechanical impediment to the passage of urine.

As the occurrence of hydatids in the female breast, in the tunica vaginalis testis, the thyroid gland, and between the muscles and integuments, constitutes the morbid structure of local diseases especially belonging to surgery, their present discussion would be irrelevant to the particular objects of this work.

Having no reason to suppose that hydatids have any inherent malignancy, the variety of morbid actions resulting from their presence are to be ascribed to mechanical irritation and compression; these are seen to be modified by their size and number, their locality, and the predisposing circumstances of the constitution in which they may occur. As mechanical irritants, the effects they produce, whether inflammatory or spasmodic, must be treated entirely on general principles adapted to the age and habit of the patient, and other circumstances, either morbid or natural, under which their occurrence is observed. When a tendency has been evinced to their expulsion by natural processes, through either of the outlets of the alvine canal, art may take advantage of the suggestion thus afforded, and by an emetic or purgative, according to the operation already induced, expedite the accomplishment of the object to be effected. When they have had their seat in the chest, or have passed into this

* Observations on Diseases of Females, by Charles Mansfield Clarke, part ii. p. 116.

cavity from the abdomen, so as to be ejected through the lungs by coughing, nature may be allowed uninterruptedly to continue its purpose, but any morbid action that may result from the effort must be counteracted by the method of treatment its peculiarity may point out. When impacted in either of the biliary ducts, and giving rise to spasmodic pains and other symptoms resembling those which arise from biliary calculi similarly situated, an emetic, unless particular circumstances should contraindicate its use, ought to be given, and if its action fail to procure the relief desired, the same kind of treatment will be required as for the analogous condition just referred to, viz. a full dose of the tincture or wine of opium, or Battley's sedative, or tincture of henbane with compound spirit of sulphuric ether in camphor mixture, to be repeated or not according to its effects: if the bowels should be in a constipated state, a combination of castor-oil and laudanum may be preferred, or if great irritability of stomach should prevail, opium combined with calomel, or with calomel and compound extract of colocynth, may be advantageously substituted: a hot bath, a blister to the epigastrium, and injections per anum of hot water with laudanum, or, if need be, purgative injections, are remedies one or all of which may be had recourse to as the necessities of the case may indicate.

When a cyst within the abdomen, containing acephalocysts, can be detected, and is adherent to its muscular parietes, distending them and producing great disorder of the system, an artificial aperture will be the readiest and perhaps the only method of cure. If contained within an abscess, the latter will be the prominent object of consideration, and the evacuation of its contents may prove a cure to the patient, and give the earliest manifestation of their presence. If not acephalocysts, however, but the attached hydatids which grow as it were from the organic structures or tissues, the disease with which they are complicated will form the more prominent object of consideration: it will be obvious that any distention of the abdomen from this cause cannot be relieved, as in ascites, from tapping, an operation to which, in the want of other means of relieving a patient, a practitioner may be urged: should the hydatids be numerous, little relief could follow, and even if the evacuation of a large hydatid were to promise greater advantage, the too common issue of such cases should warn him, except under particularly advantageous circumstances, against a step by which his reputation might suffer, and the expectation of the patient be disappointed.

When it has been ascertained that the liver is affected with hydatids, the removal of the hepatic disorder which must at the same time exist, should be the prescriber's aim; and the process will comprehend the only rational method of relieving the organ and the rest of the system which sympathizes with it. It has been suggested that mercury in its various forms may possess a specific quality adapted to the destruction of the vitality of animalcules

hydatids, particularly acephalocysts; and on this principle has its use as well as that of some other medicines been resorted to when their presence has been recognised or suspected. How far the idea may be founded on fact, time and particular attention to the subject must determine, but experience has sufficiently shown that its influence in such cases of disease has been most salutary, and is indispensable to restoring the natural secretion of the liver, and thereby communicating to the whole of the assimilative organs that degree of vigour which is the main defence of the system against noxious influences from without and morbid depositions within the body, and still further to the removal of various products of disease which a contrary state has engendered. The specific stimulus also of mercury to the absorbents is an additional reason for its prescription when the more direct removal of hydatids cannot be effected, whether situated in the liver, spleen, pancreas, kidneys, peritoneum, or other structures.

When productive of great inconvenience from their situation between the rectum and bladder, or, as in pregnancies, between the vagina and the rectum, and the nature of the resulting tumour can fortunately be determined, an incision into its most prominent part it is probable will speedily and effectually relieve the patient. The circumstance, however, being rare, and the records of medicine affording no general guide for practice on this point, the writer feels it incumbent upon him to state that the above recommendation has been suggested by the perusal of a valuable paper on tumours within the pelvis occasioning difficult parturition, by Mr. Park of Liverpool, inserted in the second volume of the *Medico-Chirurgical Transactions*, p. 296, and particularly by a successful example of the practice therein recorded, and of another in which the tumour disappeared in consequence of the pressure occasioned by the act of parturition. If hydatids have been voided with the urine, and symptoms should arise indicative of the passage of more of these bodies from the kidneys to the bladder, relief should be sought by the immersion of the patient in a hot bath, and by the administration of antispasmodics, as advised for the corresponding effects produced by their impaction in the biliary ducts. If checked in their passage through the urethra, the impediment we conceive might easily be overcome by rupturing the enveloping bag with the point of a bougie. When the uterus has been the seat of hydatids, we are told by the highest authority that "all attempts to cure the disease artificially, and to arrest its progress otherwise than through the natural efforts of the organ, have been of no avail. The patient is to be informed of its nature, and the result is to be patiently waited for. As symptoms arise they are to be treated accordingly, and the practitioner will best perform his duty by watching over the complaint, and by doing no more than is absolutely required. But when the period arrives at which the uterus is excited by distention to unload itself of its contents, then all

his skill and energy will be wanting, and all his efforts will be called forth to control the hemorrhage and to sustain the powers of the constitution." "Two or three fingers or the whole hand should be covered with pomatum, and carefully introduced into the uterus, and carried up between its sides and the hydatids, which are to be detached from the part to which they adhere by the most gentle efforts. The mass being now included in the hand of the operator is to be brought out of the uterus, it being remembered, in the performance of this operation, that the degree to which the os uteri is dilatable without laceration is in proportion to the size of the whole uterus both in pregnancy as well as in this disease. So that, supposing it to be enlarged by hydatids to the size of the viscus in the sixth or seventh month of pregnancy, the whole hand may be, if necessary, introduced through the cervix; whereas, in smaller dimensions of the uterus, if any attempt is made to introduce it through the cervix, however carefully it may be attempted, a laceration of it may ensue, and thus the patient be involved in a new danger. The contents of the uterus having been naturally expelled or artificially removed, and the hemorrhage restrained, the strength is to be restored by allowing the patient a nutritive diet, and by the exhibition of such medicines as tend to increase the tone of the system, amongst which the mineral acids and preparations of cinchona may be accounted the most serviceable: these or other medicines, possessing similar properties, should be from time to time exhibited until the vigour of the system shall have been entirely restored.

"The usual cautions given to women after delivery should be here impressed upon the patient, such as confinement to the horizontal posture until the parts shall have acquired their usual size and tone."^{*}

"The acknowledged efficacy of the ergot of rye in stimulating the pregnant uterus to contraction suggests the idea that it may in the same manner be administered with advantage as soon as it is known that the distention of the uterus is occasioned by hydatids: the writer, however, is not aware that it has ever been used under such circumstances, but as there is some reason to believe that it possesses to a considerable extent the additional property of restraining the hemorrhagic tendency of bleeding vessels, it appears probable that it may prove an eligible medicine for the purpose above specified."[†]

* See Observations on Diseases of Females, by C. M. Clarke, M.R.C.S. &c. part ii. p. 120. Lond. 1821.

† "In the fourth number of the Glasgow Medical Journal, Dr. Macfarlane, in his observations on *polypus* of the uterus, gives a case where the ergot appeared to act by promoting the expulsion of the polypus. One drachm was infused in four ounces of water, and one ounce given every two hours. The whole was given before the effect was produced. In the course of a few hours the tumour was discovered to be in the vagina. Four days after the exhibition of the ergot the polypus fell off."—From Dr. Young's Observations on the Use of *Secale Cor-*

The single hydatid of the uterus by its growth effects its own cure, and thus affords a hint which may, under other circumstances of the disease, be usefully applied; when arrived at a considerable size, a rupture of it suddenly takes place, its fluid escapes, and the cyst is expelled; the patient being in a moment relieved of her sufferings and the cause of her fears, in most instances requiring nothing more than a bandage round the abdomen to give support to the organ which has so long been distended and consequently relaxed.

In all cases of hydatids the condition of the body and the specific nature of the coexistent disease, be it either predisponent or consequent, must be special objects of remedial attention; hence the treatment connected with these morbid formations involves also that of cachexia, of the various disorders of the digestive organs, of dropsy, &c. each of which having a proper place in this work, it is necessary only to refer to them here; and it would be further a waste of time to dwell on means to be adopted for the removal of a morbid deposit under circumstances in which its presence could only be discovered by post-mortem examination.

Abstractedly considered, the removal of hydatids may be contemplated by three different methods: first, by their direct expulsion from the body, either naturally or artificially, as already explained; secondly, when their expulsion cannot reasonably be anticipated, by reinvigorating the relaxed habit of the body, and thus communicating to the absorbent system its lost power, an indication which will also be required to be attended to for the prevention of their recurrence when already got rid of; thirdly, by exciting the absorbents to extraordinary action, when the exercise of their natural function is inadequate to the end in view.

To reinvigorate the relaxed habit of body it will be necessary to avoid the influence of the external causes by which it has been reduced to this state; to select a dry and healthy residence; to use a nutritious diet adapted to the powers of the organs of digestion, improving the condition of the latter by promoting, in the first place, the due secretion of the liver, by the exhibition of such of the preparations of mercury and to such an extent as the occasion may demand. The irritative fever induced by such disorder having been allayed, the tone of the stomach must be invigorated by corresponding medicines, as, for instance, by some of the preparations of cinchona, especially the sulphate of quinine, or by quassia, rhubarb, gentian, or cascarrilla, combined either with the alkalies or sulphuric acid, according to the condition of the stomach and alimentary canal: the preparations of iron and sulphate of zinc are also medicines which will generally be adapted to constitutions thus affected.

When these or similar means are found unavailing, and the inconvenience resulting from the presence of hydatids is so considerable as

to render it expedient to attempt their removal by exciting the absorbents to extraordinary exertion, a process which requires more discrimination and care perhaps than any other in medicine, it will be necessary either to have recourse to the free use of mercury in one or other of its forms, or by persevering in the use of evacuates of the alvine canal or kidneys, or by maintaining a continued state of nausea with repeated doses of tartrate of antimony to effect the same end; but of all the excitants of the absorbent system none appear to have so direct and powerful an influence upon it as iodine: we have, however, no experience of its use in disease resulting from hydatids, and rest our anticipations of its efficacy in such cases on the great advantage stated to have been derived from it in scrofula as well as from the particular actions observed to have been produced by it in the treatment of this disease.*

In the article BRONCHOCELE will be found an excellent account of the medicine in question, which renders it unnecessary for us to enter into any further discussion upon it here; we shall, therefore, merely state, as the result of our own experience of iodine and the hydriodate of potash, that the evidence of their effects on the system in medicinal doses becomes very gradually perceptible, but that these remain so long after their use has been discontinued, as to be prejudicial by their excess, and, as far as we know, the means have not been discovered for regulating them when the necessity has been indicated.

(William Kerr.)

HYDROCEPHALUS, from *ὑδωρ*, water, and *κεφαλή*, the head. Under this term was formerly comprehended every preternatural effusion of serous fluid in the region of the head, whether external to the cranium or contained within it. In process of time, however, it became limited to effusion occurring within the cavity of the skull. Systematic writers have laid it down that such effusion may take place either between the cranium and dura mater, into the great cavity of the arachnoid, in the subarachnoid cellular membrane, or finally into the cavity of the ventricles. But hydrocephalus, in the more limited sense in which it is usually understood in this country, means a serous effusion taking place into the ventricles, or (which is a much rarer occurrence) into the sac of the arachnoid.

The disease is divisible into acute and chronic. Hufeland, Coindet, and many other late writers, have restricted the use of the name hydrocephalus to the chronic effusion, and have employed the term *hydrencephalus* to designate the acute variety; a species of nomenclature which is objectionable, as it proceeds on the erroneous assumption that the water in the latter case, and in it only, is always confined within the cavities of the brain.

1. **ACUTE HYDROCEPHALUS**.—This species has been defined by Cullen—a disease which

affects chiefly infants and young persons under the age of puberty, arising gradually, and manifesting itself at first by lassitude, feverishness, and pain in the head, and subsequently by slowness of the pulse, dilatation of the pupil, and somnolence. In addition to several of the above symptoms, Hufeland (*Conspectus Morborum—Hydrencephalon*) has noticed in his definition the tendency to convulsions and paralysis, vomiting, and constipation.

Though the chronic species is plainly alluded to by several of the older writers, it has usually been supposed that the symptoms of the acute had, till the beginning of the last century, when it was imperfectly described by Petit, escaped the observation of practitioners. This, however, is a mistake, as Hippocrates was certainly acquainted with it, as appears from a passage in the treatise *De Morbis* (lib. ii. cap. 6.), where he distinctly notices this species of water in the brain, and says that it gives rise to acute headach, pain in the eyes, double vision, blindness, vomiting, and fever;—thus clearly enumerating some of the most characteristic features of the disease, whilst at the same time he recommends purgatives, emetics, and erethines, as the means best suited for its removal.

The first accurate account of acute hydrocephalus which appeared, was that by Dr. Whytt, in a posthumous work published in 1768, entitled *Observations on the Dropsy of the Brain*. His history of the symptoms and progress of the affection is so full and accurate, that a late French writer asserts that little of any importance has been since added to it. So much cannot, however, be said for his hypothesis as to the nature of the disease. He considered it a kind of passive dropsy, and all its symptoms merely the effect of the pressure made on the brain by the effused fluid. The disposition to vomit is attributed to the sympathy of the stomach with the brain; the slow, irregular pulse of the second stage, to the cardiac nerves receiving an imperfect supply of nervous energy; the quick pulse of the third stage, to the injury now done to the cerebral fibres, and the irritation thence arising in the whole system; and, finally, the dilatation of the pupil and stertorous breathing, to the compression of the brain. But neither his theory of this affection, nor his despondence as to the possibility of its ever being cured, have been justified by later and more extensive observation. Dr. Fothergill's remarks on the hydrocephalus internus, and Dr. Watson's observations on the same subject, appeared soon after, and the latter contained one of the first instances on record where the disease terminated in recovery. A valuable addition to the usual mode of treatment was made known in 1775 by Dr. Dobson, who, with a view to increasing the activity of the absorbents in the brain, was led to the employment of mercury, and had the satisfaction to find it successful. The first approach to a correct theory of the disease was contained in the thesis of Dr. Quin, of Dublin, published in 1799, in which he pointed out its affinity to the inflammatory

* Lugol on Iodine, by Dr. O'Shaughnessy. 1832.

diseases, and supported his views by a reference to the appearances which are found on dissection in those who have fallen victims to it. This manner of considering the disorder necessarily led to a great improvement in the mode of treating it. A similar view of hydrocephalus was taken about the same time by Dr. Rush of Philadelphia, who believed it to be closely allied to phrenitis, and pushed the antiphlogistic method of treating it still further than Quin had done. Dr. Withering held a similar opinion as to its inflammatory nature, and, like Quin and Rush, considered the effluvia here, as in many other instances, a mere result of inflammation, and not as constituting the essence of the disease. His introduction of digitalis into its treatment likewise entitles him to a place in the literary history of this affection. Dr. Percival of Manchester strongly advocated the use of calomel and opium in hydrocephalus, and strove to give precision to the mode of employing the various remedies previously in use. Amongst the writers who have most contributed to throw light on the nature and treatment of hydrocephalus, we may place, in addition to those already mentioned, the names of Cheyne and Abercrombie in this country; Odier and Coindet in Geneva; Guersent and Lallemand in France; Formey, Portenschlag, and above all Gölis in Germany. Besides these, we shall have occasion to allude, in the course of this article, to several others who have made important additions to our knowledge of the disease.

Precursory symptoms.—In a great majority of cases premonitory symptoms may be detected; and of these the greater number and the most striking are connected with derangement of the digestive organs. The appetite is either capricious or defective; the tongue slightly furred and the breath heavy; the epigastrium and hypochondria are occasionally tumid and tender on pressure; the biliary secretion is deficient or vitiated, as is evident from the torpor and irregularity of the bowels, and the unnatural appearance of the stools; the urine is high-coloured and diminished in quantity; the cutaneous circulation loses much of its vigour, as is evident from the faded and unhealthy complexion and harshness of the skin. To the attentive observer slight indications of the derangement of the cerebral functions may even at this early period be discovered, in the languid manner and frequent drowsiness; the disturbed and restless sleep, from which the child awakens unrefreshed; in the occasional complaints of giddiness or confusion, of noise or slight pain in the head, or of pains like those of rheumatism in various parts of the body and limbs. The pulse as yet deviates little from its natural condition, but on attentive examination some of its beats are found weaker than others, and an occasional intermission may sometimes be detected. The child becomes silent and irritable, indifferent to such persons and things as it formerly took an interest in, frequently assumes a grave and thoughtful appearance, or falls into a reverie, from which it

awakens with a sigh. Notwithstanding all this evidence of deranged function, the patient often makes little complaint, even when closely questioned. When the disease is about to manifest itself in a more unquestionable shape, flushings and chills frequently alternate; the gait becomes laborious and unsteady. "In stepping forward," says Gölis, "they raise the foot as if they were stepping over a threshold—they totter and stagger as if drunk."

Dr. Yeats, who has made the earlier stages of the disease his peculiar study, places amongst the premonitory symptoms occasionally present, tenderness in the scalp, stiffness of the neck, increased sensibility of the eyes to light, and in some rare cases severe ear-ach. He also draws attention to the remarkable change from the healthy appearance which the countenance undergoes, the transient paleness and occasional collapse of the features, the dulness and loss of expression in the eyes, and the dark line under them. A teasing cough is sometimes present; there is an unusual tendency to constipation. If aperient medicines be given, the consequent evacuations are both harder and less abundant than they were wont to be from a similar dose; in colour they are sometimes lighter than natural, and at others tinged of a dark greenish hue, and accompanied with slimy matter.

It must be confessed that there is nothing essentially characteristic in the above symptoms, and that even when all are taken together, they rather indicate a derangement in the functions generally, than point in an unequivocal manner to incipient disease of the brain. Still they are sufficient to justify much watchfulness on the part of the friends and of the medical attendant, and particularly so when the child discovers an unusual precocity of intellect, or is one of a family which has already suffered from hydrocephalus, or from scrofula in any of its forms. The mere occasional exhibition of a purgative will in such cases, as Dr. Yeats very truly observes, usually prove quite inadequate to the removal of the symptoms; nothing less than the systematic employment of a combination of alteratives and aperients, continued for some time, being capable of producing this effect.

Dr. Cheyne has the merit of having been one of the first writers who strongly directed the attention of the profession to the derangement in the functions of the liver and of the alimentary canal, which so often precedes, and not unfrequently seems to excite, this affection of the brain. The proportion of cases in which the diseased action commences in the abdominal viscera is, he thinks, very considerable. He was led to this belief partly by having observed how usually derangement of the above named organs precedes hydrocephalus, and partly from the remarkable benefit which, in the early stages of the affection, so often ensues upon the use of active purgatives, and finally, from the frequency with which unequivocal marks of disease are discovered in the liver or intestines on dissection. In the incipient stage, or while the disease of the brain

is as yet only forming, the colour of the stools indicates an inactive state of the liver, whilst at a subsequent period, when hydrocephalus has become fully established, the bile seems to be both vitiated and in excess. The intimate sympathy which exists between the brain and the liver is well known to surgeons, and that between the brain and the stomach and intestines is familiar to every one.

There is, we think, a general aversion amongst French pathologists to admit the sympathetic or secondary origin of diseases, and accordingly most of them, in treating of hydrocephalus, have looked upon the morbid appearances found in the abdomen as a mere casual complication, and by no means the cause of the cerebral affection. M. Brachet of Lyons has, however, departed from the general rule, and admitted a gastric variety of hydrocephalus (*hydrocephalite gastrique*), in which the disorder of the digestive organs evidently precedes that of the brain, and in which subsequently, during the progress of the cerebral affection, the violence of the gastric symptoms seems clearly to indicate that the irritability of the stomach is not the mere effect of sympathy, but the result of inflammation in the mucous membrane itself.

Less importance has been attributed by Dr. Abercrombie than by most other late British writers, to derangement of the chylipoietic viscera as a cause of hydrocephalus. Disease of the brain in unhealthy children, he admits, may appear in connection with that of the liver or other abdominal organs; but the latter, he thinks, cannot correctly be said to be the cause of the former; on the contrary, he looks upon both as a common result of a tendency to chronic or scrofulous inflammation. When we consider, however, the close and unquestionable sympathy which exists between the head and the digestive organs, and take along with this the greater exposure of the latter to irritating causes and consequent functional derangement, we are disposed to think that the now very generally received opinion as to the frequent origin of hydrocephalus in abdominal disorder is well founded. Dr. Abercrombie, indeed, himself admits that the more acute affections of the bowels have some pretensions to be considered an occasional cause of the disease, though even here the connection is, he thinks, very obscure; and the secondary affection in some of them arises, perhaps, merely out of the general febrile excitement. In admitting the precedence of the derangement of the digestive organs and its occasional connexion with disease of the brain, all that is of any practical importance is conceded. How this connexion is to be explained matters little. The comatose state in which inflammation of the mucous membrane of the bowels in infants about the period of weaning often terminates, is a striking instance of this origin of cerebral derangement. A remarkable diminution of the urinary secretion frequently precedes the oppression of the brain, and may possibly sometimes, as Dr. Abercrombie has suggested, be in some degree connected with it.

Under the title of "Erethysm or Irritation of the Brain in infants," Dr. Whittock Nichol has described a state which, as it is accompanied by no increased determination of blood to the head, is distinct from inflammation, though it may, if neglected, terminate in it. It seems, consequently, to be one of the forms in which the precursory symptoms of hydrocephalus occasionally present themselves, and in which they appear to depend on a peculiarly irritable state of the nervous system. "It is a state," says Dr. Nichol, "in which inordinate effects arise from ordinary impressions upon different parts of the nervous system." The child is wakeful, irritable, and attentive to every sound and every object of sight, and is easily startled; the eye is very sensible to light; there is frequent sneezing; and repeated winking or a firm spasmodic closing of the eyes is occasionally observed. A frequent, sudden cry, without any obvious cause; clenching of the fist, with the thumb laid across the palm; throwing back of the head, and a degree of opisthotonos, are amongst its occasional symptoms. The temperature and pulse may be sometimes raised, but are for the most part natural. Scrofulous children are the most prone to this affection. It may be called into existence by any irritation of the extremities of the nerves, as by painful dentition, by disorder of the liver or alimentary canal, by surgical operations, ulcers, burns, or suppressed discharges. Great wakefulness in infants should always excite attention, as it is very apt to terminate in inflammation of the brain. Children in whom this alarming symptom appears should be carried out much in the open air, and have the head sponged daily with cold water, and the bowels kept in a free state. If it still persist, and we can detect any evidence of undue determination of blood to the head, leeches must be employed. If, on the other hand, the watchfulness and increased sensibility of the nervous system exist simply, small doses of Dover's powder are recommended by Dr. Nichol, and should be repeated at intervals of five or six hours, so as to procure a sufficiency of sleep. We believe, however, that when the bowels are duly attended to, and care is taken to give the child the advantage of air and exercise, the aid of narcotics need rarely be had recourse to; and till every other method of inducing sleep has been tried and failed, we should certainly not advise their exhibition.

Though hydrocephalus in its advanced stages presents considerable uniformity in its symptoms, yet so great a variety is there in its manner of commencement, as fully to justify Quin in styling it a truly proteiform affection. These varieties have been reduced by Dr. Cheyne to three principal ones, which may be respectively entitled the gradual, the rapid or violent, and the secondary, under one or other of which most of the cases met with in practice are reducible.*

First or gradual form of attack.—It is

* Hopfengärtner has made a division of hydrocephalus into three varieties, which coincides very nearly with that of Cheyne, viz, into, 1st, the *nervous*, which at its commencement strongly resem-

in this form that the precursory symptoms, into which we have entered with so much detail, are the most obvious. The disease here comes on by slow degrees, and at its commencement its true nature is involved in considerable obscurity. The child is indisposed for many days or even weeks, complaining from time to time of slight pain in the head or belly, together with which there is anorexia or capricious appetite, and evident derangement in the functions of the abdominal viscera. It is all this while somewhat feverish and dispirited; its colour fades, and the eye becomes dim. A dragging of one of the legs, or a painful stiffness in the back of the neck, has sometimes been observed from the very commencement. The pain in the head soon becomes severe, returns at shorter intervals, and is complicated with vomiting, which, as well as the headach, is much aggravated by motion. By these symptoms the fears of the friends are at length awakened. The child now seems unable to support the weight of the head, sighs frequently, and looks dejected; the eyes are pained by a strong light, the pupils much contracted, and flashes of light are occasionally complained of. The derangement of the abdominal functions is indicated by the white tongue, by costiveness, or the unnatural appearance of the stools, which are at first of a clay colour, but gradually become gelatinous and of a dark-green hue, and have a peculiar heavy smell. The pulse becomes rapid, and frequent exacerbations take place, characterized by increased heat and irritability, with flying pains in various parts of the body, in the nape of the neck or limbs, the chest or abdomen. This first stage usually lasts for ten days or a fortnight, the patient gradually becoming weaker and much altered in appearance, unsteady in his motions, and fretful.

Second or rapid form of attack.—The disease here assumes a more acute and turbulent form. After a brief period of indisposition, which has possibly been overlooked, the fever appears suddenly and violently, with only short and irregular intermissions. There are frequent flushings, severe headach, occasional brilliancy of the eye, with increased sensibility of the retina, and indeed of the whole nervous system, and frequently pain in the abdomen, and tenderness on pressure.

It is this form of hydrocephalus which bears so strong a resemblance to fever as often to have been confounded with it. With proper care they may, however, be usually distinguished. "We are led to suspect," says Cheyne, "some deeply seated evil from the frantic screams and complaints of the head and belly, alternating with stupor, or rather lowness and unwillingness to be roused; and we are struck with the great irritability of the stomach, which exists in a degree beyond what we generally find it in the fevers of this country, retching and vomiting being brought on by a

bles a low nervous fever: 2d, the *inflammatory*, characterized by high fever and evident congestion of the head: 3d, that which succeeds to *scarlatina* several days or weeks after the disappearance of the eruption.

change of posture, and certainly by every attempt to sit up in bed; and the disordered state of the bowels which attends this irritability of the stomach is also remarkable. And when at any time the child has a little respite from the violence of these symptoms, we find our suspicions confirmed by his look; for when the features do not express pain or terror, there is not unfrequently a vacancy of look, the eyes being set, with an expression of dejection which is peculiar to certain diseases of the brain."

Third form of attack.—When hydrocephalus supervenes upon other diseases, as upon scrofula or painful dentition, the exanthemata, remittent fever, or hooping-cough, it is called metastatic or secondary. When it ensues in the course of an acute disease, its approach is most insidious. The symptoms of the early stage are almost all absent, and palsy and convulsions often afford the first evidence of the brain having become implicated. Even pain in the head is occasionally never complained of; and Dr. Quin alludes to a case in which not one characteristic symptom of hydrocephalus had occurred, and yet a large quantity of fluid was discovered in the ventricles.

Of these three modes of commencement, the first is the most frequent. The second occurs perhaps seldom more than either of the other two, but is the most regular in its progress, and presents the different stages the most distinctly marked. It answers to what Gölis has called the *tumultuous* form of hydrocephalus; and to Guersent's *hydrocephale ataxique*. It is the most acute variety, and Gölis thinks it the most amenable to the influence of medicine, both because it occurs in the healthiest children, and because, being often ushered in by sudden fever and severe convulsions, it is apt to excite attention in its commencement, and thus has more frequently the benefit of early treatment. But if the critical moment for the employment of active measures be lost, in a few days, or sometimes even in a few hours, effusion and palsy ensue. Recoveries from the third form are very rare, which is ascribed partly to the progress which the affection of the brain has usually made before there is any suspicion of its existence, and partly to the debility produced by the previous disease often rendering active treatment inadmissible.

Stages of hydrocephalus.—The great variety and complexity of the symptoms of hydrocephalus have led most writers on the subject to attempt their simplification by distributing them into separate groups characteristic of successive periods of the disease. Dr. Whytt, struck by the remarkable differences which the pulse presents in the progress of this affection, has assumed it as the groundwork of a division into three stages, in the first of which the pulse is quick, in the second slow and irregular, whilst in the third it rises again, and becomes rapid and feeble. By Gölis four stages have been described, founded on the presumed pathological condition of the brain at successive periods of the disorder. These are, first, the period of turgescence,

which answers nearly to what we have called the precursory symptoms; second, the period of inflammation; third, that of effusion; and, lastly, that of palsy. But two stages, on the other hand, have been admitted by Frank and by Conradi; what Gölis calls the stage of turgescence being by them considered as merely indicative of the approach of the disease, whilst the two last stages of Gölis and of Whytt, not appearing to them to be really distinct, have been consolidated into one. The threefold division of Whytt appears, however, to have practical advantages sufficient to justify us in retaining it. It is that which has been adopted by Cheyne in his valuable essay; but in naming these stages, he has proceeded on a different principle from Whytt, characterizing them by the state of the nervous system instead of that of the circulation. Thus, the first he calls the period of increased sensibility, the second that of diminished sensibility, and the third that of palsy or convulsions. "In the first stage," says he, "every stimulus produces an impression more than proportioned to its common effects. There is generally a great aversion to light and to sounds; there is watching, sickness, pain, and a quick pulse. In the second stage, the child is not easily roused, his pupil is dilated, his pulse slow; he is lethargic, with obstinately costive bowels. In the third stage, which perhaps might be considered as a continuation of the second, there is squinting, rolling of the head, raving, stupor, convulsions, with a rapid thready pulse."

Many cases do, it must be confessed, present themselves which set these and all other artificial divisions at defiance, cases in which the most careful observers fail in detecting any thing like a succession of regular stages. Thus convulsions, in place of first occurring near the end, occasionally usher in the disease; and as to the pulse, we have ourselves found it keep high during the whole course of the illness; whilst others have met with cases where it never exceeded the natural standard; and others, again, instances of its being remarkably slow at the very commencement of the attack.

First stage.—The morbid phenomena of this period are so variable, that it would perhaps be impossible to give any description of it answering accurately to all cases. Amongst the symptoms most frequently present are pain in the head and eyes, occasionally alternating with pain in the abdomen, in the limbs, or in the nape of the neck. There is usually a certain degree of fever, with great restlessness and total inability to sit up for any length of time. During the sleep, which is very disturbed, there is frequent grinding of the teeth, and the child often awakens with a scream of terror. The head feels hotter than natural, the conjunctiva is occasionally slightly injected, and the pupil usually closely contracted. There is a manifest aversion to light and noise, with other indications of increased sensibility of the nervous system. The intellect is often but little impaired, for replies, though unwillingly made, are usually correct. The symptoms of disorder in the digestive organs are numerous.

The nostrils are always dry, and the lips cracked. The tongue is for the most part slightly furred, and the breath has a faint sickly smell. There is usually complete anorexia, but often less thirst than would seem consistent with the degree of feverishness present. Vomiting very frequently occurs, and is aggravated extremely by the erect posture, or by carrying the child out of bed. The epigastrium and hypochondria are often tumid and slightly tender on pressure, but in the progress of the disease the belly usually falls in, and becomes flaccid, though no proportional increase in the stools has taken place. There is commonly a great tendency to constipation; and evacuations, when procured by medicines, are generally of a dark greenish spinach-like appearance. The occurrence of such discharges does not depend, as many persons have asserted, on the employment of calomel, as they often exist before a single dose of this medicine has been given, and are frequently procured also by other purgatives. We have not, however, by any means found them invariably present. Their peculiar colour has been attributed to morbid bile, but there is reason, as we shall afterwards see, to doubt whether this be universally the cause. The urine is deficient in quantity and turbid, with a whitish sediment; it is often retained or suppressed for a great many hours, and dysuria is not unfrequently complained of.

The functional derangement of the respiratory organs is manifested by the occasional cough, the irregular breathing and moaning, and by that deep sighing which is almost pathognomonic of affections of the head. The pulse is considerably accelerated, and is very excitable. An occasional irregularity and slight inequality in the force of succeeding strokes may be discovered as the second stage approaches. The skin is dry and of an unhealthy colour. An eruption of almost imperceptible vesicles, which become, however, more obvious towards the latter period of the disease, now occasionally manifests itself. They occur chiefly about the mouth, cheeks, and forehead, the outside of the humerus, and the upper part of the chest. They were first pointed out by Formey of Berlin, and have been subsequently noticed by Gölis, Raimann, Schmalz, and other German pathologists. Though these writers speak of this eruption as an almost invariable occurrence in hydrocephalus, it has attracted little attention in this country, where almost the only mention of it that we have met with is that by an anonymous writer in the second volume of the *Edinburgh Medical and Surgical Journal*, who says that it has been considered as a certain sign of approaching death. Whilst on the subject of the skin, we may mention that ecchymosed and gangrenous spots have been observed near the close of fatal cases, and we have at the same period remarked a few large-sized vesicles scattered over the body at distant intervals.

The duration of the first stage varies according to the acuteness of the attack, from a few hours to a week or more.

Second stage.—The pulse, which had been

gradually getting weaker, now becomes irregular, of unequal force, very variable, and unnaturally slow; yet it is still liable to be greatly accelerated on the slightest exertion, or when the patient is taken out of bed, or even placed in the sitting posture. The slow pulse is accompanied with a gradually increasing heaviness and torpor, and the head is now generally less complained of, though this is by no means universally the case. Squinting and impaired or double vision now occur along with dilatation and immobility of the pupil, an oscillatory state of the iris occasionally preceding its permanent retraction. The child lies with the eyes half closed, in a soporose state, which is interrupted from time to time by exclamations of suffering extorted by the momentary increase of pain. The sickness and vomiting often now diminish; appetite occasionally seems to return, the child greedily swallowing any food which is presented to it; but the bowels still continue obstinately bound, except while under the influence of powerful purgatives. The stools as well as the urine are passed unconsciously. The hands, which are tremulous and unsteady, are frequently raised to the head and back of the neck, and the child is almost incessantly picking at its nostrils, lips, or hair. Spasmodic winking or a fixed stare, a stern or a desponding expression, often rapidly succeed each other. There is great emaciation, and frequent partial suspirations indicative of extreme debility and of irregularity in the distribution of the blood.

The soporose state is now often suddenly and unexpectedly dispelled, the child recovering the use of its senses, and noticing and even taking an interest in surrounding objects. But this deceitful calm is usually of short duration, and is followed within one, or at most two days, by a deeper state of coma than before. The shrill piercing scream, which is so characteristic of hydrocephalus, occurs chiefly in this stage; and during its continuance the pulse becomes almost innumerable, and the cheeks suffused. The duration of the second stage may be variously stated at from one to two weeks.

Third stage.—A feeble attempt at reaction now manifests itself, the pulse again rising and attaining to a height which is scarcely equalled in any other disease. We have counted it as high as two hundred in a minute, and Whytt once found it even so high as two hundred and ten. Convulsions in every degree from slight spasmodic twitching of the face and vibratory motion of the eye-balls up to violent contractions of the muscles of the trunk and extremities, take place, and are usually soon followed by paralysis of one side, the opposite side continuing to be convulsed at intervals. The child lies raving and insensible; moaning and sighing, waving the unpalsied hand through the air, and rolling its head from side to side on the pillow. The cheeks are alternately flushed or pale; the eye half closed, as if from partial paralysis of the levator palpebrarum; the conjunctiva bloodshot, and the cornea dim and covered over with a slimy secretion; the pupil

is dilated, the teeth grind violently together, or there is a frequent smacking of the tongue and lips. The balance of the circulation is lost, the skin being dry and burning in some parts, and drenched with partial but profuse perspiration in others. The feet grow cold, the pulse gets weaker and weaker, the respiration unequal and stertorous, and a violent convulsion often closes the scene.

The length of the third stage is even more uncertain than that of the two preceding, varying from a few hours to one or even two weeks.

The duration of the whole disease, where the elements of which it is made up are so variable, is necessarily very uncertain. It may be stated approximatively at from two to three weeks, but it is generally nearer to the latter than the former. There has, however, been the greatest difference of opinion as to the time the disease lasts, arising partly from the variety which actually exists in different cases, and partly from the difficulty, in those cases where hydrocephalus is grafted on a previous disease, of ascertaining precisely the period at which it originated. Fothergill, Cheyne, Gölis, and the majority of writers think it usually runs its course in less than twenty-one days; whilst Whytt, on the other hand, has attributed to it a period of from four to six weeks, and Frank has mentioned a case which lasted the longest of these periods. It seems to be considerably influenced in this respect by age, as in very young infants it is often over within a week; and Coindet has mentioned one instance which terminated fatally within three days. A still more rapid species, in which effusion and death take place within a few hours from the commencement of the attack, has been described by Gölis under the name of the water-stroke (*wasserschlag*), or hyperacute hydrocephalus, which may, according to this writer, be either an idiopathic affection, or else the consequence of the repulsion of some of the exanthemata, or of the suppression of some cutaneous discharge, (as that from *crusta lactea*, *tinea*, sore ears, &c.) or of the sudden and imprudent checking of a diarrhoea, dysentery, or perspiration. The precursory symptoms in this variety are either absent or so slight as to escape notice; and the stages of inflammation and effusion seem to be almost coincident, the fluid being poured out at the very onset of the disease. Such a disorder rarely leaves any time for treatment, and it terminates almost invariably in death. On dissection, a fluid more turbid than that usually found in hydrocephalus is detected in the ventricles. Of the cases of hydrocephalus appended to Gölis's work, the most rapid was one which terminated fatally in twelve hours; in the majority death seems to have occurred about the seventeenth or eighteenth day. Springel has assumed fourteen days as the average duration. When the disease makes its attack in a very violent form, infants may be cut off by convulsions in its very commencement.

Prognosis.—Hydrocephalus has always, and with too much reason, been considered a very

fatal disorder. It does not, however, as some would have us believe, universally and necessarily terminate in death. Since its diagnosis in the earlier stages has become more accurate, and its inflammatory nature in the majority of cases been generally recognized, patients have been saved much more frequently than formerly. Recovery has been known to take place after the occurrence of all the most decided symptoms of the disease; slow pulse and stupor, strabismus, dilatation of the pupil and blindness, convulsions and paralysis. In Dr. Cheyne's essay numerous instances of recovery under the influence of judicious and energetic treatment are detailed. At Geneva, according to Odier, about eighteen children on an average are attacked by it yearly, and of these about six or one-third recovered. Of the eleven cases recorded by M. Brichteau, four recovered; of Dr. Mills' twenty-eight cases, seven; and of the thirty-seven given in Gölis's work, five had a similar termination. In the whole practice of the latter physician, which has been unusually extensive in the diseases of children, forty-one cases of recovery from hydrocephalus have been met with; these were, however, very early seen, and being subdued in the inflammatory stage, have been thrown in his tables under the head of inflammation of the brain. These results are very gratifying to those who feel an interest in the progress of medical science, and form a pleasing contrast to the desponding views of Whytt and Fothergill, and the other early writers on the disease. "So long," says Dr. Cheyne, "as the pulse continues steady and the breathing natural, we are not to be prevented by the most alarming symptoms from an employment of active remedies." A very few instances of what may almost be called spontaneous recovery, so inefficient was the treatment employed, are to be met with in medical writings, and must still farther encourage our exertions on the behalf of those labouring under the disease. Willan speaks of an infant which recovered in the fifth week of its illness, though its case had been abandoned by the medical attendants as hopeless. No medical man who has a due regard for his own character or for the feelings of the friends of a hydrocephalic patient, should desert a case of this kind at any stage, however unpromising it may be. Under circumstances apparently desperate, a temporary or even permanent amendment will sometimes most unexpectedly take place; and if a new medical attendant has been called in, what is perhaps only the effect of an effort of nature will be set down to the credit of his superior penetration and more judicious measures. After effusion has occurred, the disease is generally supposed to be utterly hopeless; but such a dogma should be allowed to exert no influence on our practice, both because it seems unwarrantably to limit the powers of nature, and because we possess no unequivocal signs from which we can certainly conclude that such effusion has actually taken place; for all the symptoms usually attributed to it may, it is now well known, be produced by inflammation alone.

In forming our prognosis, much attention must be paid to the state of the pulse and of the excretions. If the pulse, from being very quick, falls slowly and moderately, the prognosis must be more favourable than where it comes suddenly down; the former shewing a diminution of fever, whilst the latter might imply that the second stage of hydrocephalus was about to establish itself. Inattention to this point in suspicious febrile cases has often led practitioners into disagreeable mistakes; the fall of the pulse inducing them to give a very favourable prognosis, and pronounce the disease at an end at the very moment it was about to assume a new and fatal aspect. Where the pulse, on the other hand, has already become unnaturally slow, a slight increase of frequency may be considered a favourable circumstance; whilst a rapid and very considerable rise would point to the commencement of the final stage.

An increased facility in procuring stools, an improvement in their appearance, a plentiful secretion of urine, a profuse warm perspiration, or a running from the nose, are to be considered promising circumstances. It is on the latter of these evacuations that the vulgar reckon most, and empirics often take advantage of their credulity to exhibit powerful emetics, a practice which is said, we know not how truly, in some rare instances to have been successful. We must beware, however, of attributing too much importance to any single symptom: thus we have known a profuse perspiration about the head and neck occur though the disease was rapidly hastening to a fatal conclusion. Indeed partial perspirations here, as in most other cases, are generally to be looked on with a suspicious eye: in the stage of palsy they are the usual forerunners of death.

If under the influence of powerful medicines or otherwise, an intermission of symptoms for two or three entire days takes place, we may entertain good hopes of recovery; but unfortunately this cessation is rarely so prolonged. In the great majority of cases the truce is a brief and fallacious one, the irregularity of pulse, headach, vomiting, &c. recurring in a few hours, and the disease proceeding rapidly to its fatal termination. Even in cases of apparent recovery we must not be too sanguine as long as the pupil continues dilated, or contracts but sluggishly on exposure of the eye to a strong light.

Where the acute disease supervenes on the chronic, the prognosis is very unfavourable; not indeed on account of any irritating or corroding quality which the effused fluid has, as some of the German writers fancy, contracted, but on account of the almost irremediable nature of the exciting cause and the debilitated state of the constitution generally. Where it occurs during the slow and imperfect convalescence from an acute disease, or develops itself in the course of hooping-cough, infantile remittent, or painful dentition, or succeeds to some scrofulous affection or other tedious disease by which the powers of the constitution have been greatly reduced, recovery very rarely takes place. This

is attributable in some of these instances, partly to the extreme difficulty of detecting the disease of the head in its incipient stage, and partly to the debilitated state of the patient not admitting of the employment of those active measures which the nature of the local disease requires. That variety which occasionally occurs as a sequela to scarlet fever is generally more within the influence of medicine than the other kinds alluded to above. On the other hand, that which occurs in the early stage of this disease or of the measles, usually assumes a very violent form, and is, as we have already stated, almost always rapidly fatal.

Amongst the possible terminations of acute hydrocephalus is its passage into the chronic form; but this is extremely rare, and is scarcely to be desired, being very liable to be accompanied with blindness or deafness, idiocy, epilepsy or paralysis, or some other lamentable impairment of the functions of the nervous system, arising from the serious injury which the brain has undergone. Such consequences are, however, not universal. Guersent mentions a case which, having become chronic, got completely well on the spontaneous occurrence of a cutaneous eruption, and that too after all the ordinary means of treatment had proved ineffectual.

It has appeared to Dr. Cheyne that hydrocephalus is more frequently cured when it occurs in such constitutions as have a decided predisposition to it, which may always be presumed when several individuals of the same family have been successively attacked. This apparent paradox is perhaps only explicable on the supposition that previous losses dispose and enable parents more early to detect the incipient symptoms of the disease, and thus lead to the employment of an appropriate treatment at that period when medicine is most likely to be of any avail. Success has by some been thought most probable in those cases which come on slowly and gradually, and thus afford ample time for treatment. According to Abercrombie and Gölis, on the contrary, those are the most favourable in which the symptoms indicate very active inflammation, and admit of energetic treatment; whilst the least promising cases are those where the inflammation is of the low or scrofulous kind. "In all," says the first of these writers, "the period for active practice is short, the irreparable mischief being probably done at an early period of the disease."

Diagnosis.—There is perhaps nothing more characteristic of this affection of the brain than the rapid fluctuations which the several functions of the body undergo, and that often within a very brief space of time. This mutable condition is indicated in the cerebral functions by the state of the intellect and senses, now unnaturally acute, again dull, and at times altogether obliterated. The muscular system is at one moment unaffected save by debility, and the next moment perhaps convulsed or paralysed. The pulse and capillary circulation are constantly varying under the influence of slight or inappreciable causes, the face being

at one moment flushed and at the next deadly pale, whilst heats and chills, perspiration and dryness of the surface, rapidly alternate. The respiration likewise undergoes endless changes in force and frequency. The functions of the digestive organs are equally variable, anorexia and incessant vomiting being succeeded by an apparent insensibility of stomach, or a ravenous and indiscriminating appetite.

Of effusion having actually taken place, there is, as we have already stated, no symptom nor even set of symptoms, which can afford us *certain* evidence. Somnolence, strabismus, convulsions, and partial paralysis, which were once so much confided in, have lost much of their credit since pathological anatomy has been more diligently cultivated; and numerous cases are now on record where they all existed though no water was found on dissection. Coma, immobility and dilatation of the pupil, and blindness, and sundry other symptoms which have been supposed by later authorities to be more worthy of reliance, will also frequently deceive us as far as effusion is concerned: their true value consists in fixing attention on the state of the brain itself. When we recollect that the effusion is a mere result or consequence of the disease, and reflect on the complicated state of cerebral derangement which often precedes or coexists with it, the difficulty of recognizing it with certainty during life will cease to surprise us. In a practical point of view, moreover, it is of less importance than is generally imagined. It is not the effusion, so much as the morbid state of the parts within the cranium which leads to it, which is the legitimate object of treatment: over the former, when it already exists, many doubt whether medicine can exert any influence.

The difficulty of distinguishing hydrocephalus in its earlier stages from many of the febrile affections to which children are liable is often very considerable. We may generally avoid confounding it with the infantile remittent fever by attending to the extreme irritability of stomach, and its aggravation by the erect posture and by motion—the greater severity and constancy of the headach—the disposition to somnolency, the child often falling asleep the moment after it has been replaced in bed, or after it has been answering our questions—the knitting of the brows and aversion to light and noise, the pupil being at first contracted and subsequently unnaturally dilated—the caution in moving the head, and the frequent raising of the hands to it—the thrusting back of the neck—the variability and extreme excitability of the pulse—the green stools or obstinate costiveness. The morning remissions moreover, if they occur at all, are much less marked in hydrocephalus than in the infantile remittent. Amidst our efforts to establish a diagnosis in any particular case, we must not forget that diseases are at times, in the language of the older writers, convertible into each other; or that, to use the more moderate phrase, complications may arise in their course, and the secondary affection eventually predominate over the original. It

is thus that in the course of infantile fevers hydrocephalus frequently comes on, and often with such insidious advances as altogether to elude observation almost up to the very moment of its fatal termination; we confess we have even remained doubtful as to the existence of the disease within the head till the scalpel revealed its presence. Where infantile remittent is about to pass into hydrocephalus, the remissions become gradually less and less distinct. Pain is in some cases never complained of.

Fevers of a typhoid type are comparatively rare in children, and when they do occur can scarcely, with ordinary attention to the symptoms, be confounded with hydrocephalus. Gölis has, with a truly German patience, been at the pains of drawing a long parallel between the two diseases. The more equable pulse, the diarrhoea with dark and fetid stools, the trembling tongue, petechiæ, and low muttering delirium, the tumid belly, supine posture, and sliding to the bottom of the bed, to say nothing of the absence of all the more striking symptoms of hydrocephalus, will scarcely suffer us to confound a case of typhus with even the obscurer examples of the former disease.

In connection with low and protracted fever, symptoms frequently occur, as has been remarked by Abercrombie, which seem to indicate serious affection of the brain, and yet these shall all disappear as the fever subsides. Thus he gives a case of a child labouring under a tedious disorder of this kind, accompanied with stupor, blindness, dilated pupil, and squinting. After lying speechless for near a month, it gradually recovered after a copious discharge of matter from one of the ears. We think it probable, however, that the essential part of hydrocephalus, namely inflammation in the central parts or at the base of the brain, was present here, and that the fever was throughout only symptomatic, and its cessation attributable to the escape of pus from the external meatus.

A want of correspondence in the symptoms has been pointed out as one of the marks of this disease of the brain. Thus, when the headach is greater or more permanent than accords with the degree of fever, and especially if the pain increases in intensity as the pulse falls, our suspicions should be awakened. Brichteau dwells on the slightness of the thirst and its total disproportion to the fever. This, however, is by no means invariably the case. Many children labouring under hydrocephalus drink largely, so that M. Brachet, another French writer, has even considered the extreme avidity with which they seize the vessel containing their drink as one of the most remarkable symptoms of the disease.

The frequent and deep sighing and the peculiar scream, such as might be uttered under the agonies of a severe surgical operation, are also very characteristic of the disease.

Severe pains appearing successively in different parts of the body, and for which we cannot in any way account, should in children as well as in adults always excite suspicion, and make us turn our attention to the nervous sys-

tem, and especially to the state of the organs contained within the cranium and spine.

The diagnosis is peculiarly difficult in feeble children who have been exhausted by long previous illnesses, as scrofula, painful dentition, or chronic disorders of the digestive organs already attended with vomiting. Quin met with a case of acute hydrocephalus which proved fatal in seven days, in which there was no evident division into stages, no dislike of light, nothing characteristic in the pulse, no dilatation of the pupils, nor any violence of headach; and Rush alludes to similar cases.

In very young infants the detection of the disease in its early stage requires the closest observation. Long-continued wakefulness, or starting from sleep with a cry of alarm, or prolonged screaming without any obvious cause, should always awaken our apprehensions; and when the infant subsequently lies moaning and drowsy, and rolling the head from side to side on the nurse's arm, or thrusting it back against the pillow; when there is frowning and aversion to light, a contracted state of the pupil, and unusually frequent vomiting, our suspicions are almost converted into certainty. The negative indications also, or the absence of well-marked disease in the chest or abdomen, will frequently throw additional light on the nature of the case. The face, as has been remarked by Cheyne, is expressive rather of uneasiness than of acute pain; nor is there the extreme violence of temper or the alternate throwing out and drawing up of the legs which accompanies colic and griping pains in the bowels. "In no other infantine complaint do we observe the same knitting of the eye-brows unaccompanied with crying. The head hanging over the nurse's shoulder, and the half-closed eye-lids are also alarming symptoms." Where convulsions together with strabismus, dilated pupil, blindness, and a comatose state, have already taken place, the nature of the case is but too evident. Convulsions, as we have already stated, sometimes occur even at the commencement of the disease; no one, we believe, at the present day considers them ever to be a purely idiopathic affection; whatever may be their exciting cause, they indicate serious functional derangement of the nervous system, and what was originally perhaps only sympathetic disorder, may, if neglected, terminate in organic disease. When convulsions or spasm of the glottis, which may be considered as a modification or local species of them, resist the ordinary means for correcting disordered states of the digestive organs and improving the general health, we should suspect a tendency to disease of the brain, and take our measures accordingly.

A readiness in detecting that species of hydrocephalus which occurs some days or weeks after an attack of scarlatina, is peculiarly desirable, both because it is an affection by no means of rare occurrence, and because, if taken early, it is the most manageable perhaps of all the forms of dropsical effusion within the head. The first symptom which warns us

of its existence is severe headach; and if this be neglected, convulsion, loss of sight, and a comatose state soon follow. Like the general anasarca which usually accompanies it, it is a truly inflammatory affection, and may be often speedily arrested by the use of active antiphlogistic measures. It is most to be dreaded when it makes its advances in a slow and insidious manner. The sudden disappearance of the anasarca, when unaccompanied by any increase in the evacuations, occasionally gives rise to this affection of the head.

A lethargic state, with irregularity of the pulse and dilatation of the pupil, occurring with or without fever, occasionally depends on constipated bowels, and vanishes rapidly on the exhibition of an active purgative; but it is highly probable that such cases, if neglected, would often pass into confirmed hydrocephalus; for we cannot agree in opinion with Willan and Underwood in thinking that cases, though they possess all the characteristic symptoms of hydrocephalus, yet are not really allied to that disease provided they yield to the free use of purgative medicines. Dilatation of the pupils has sometimes seemed to depend on the presence of worms in the intestines.

In all cases of doubt it is safer to lean to the supposition of the disease being hydrocephalus, and to treat it as such. From this, even though we should be in error, little inconvenience can arise; whilst on the other hand, if we wait until unequivocal symptoms of the disease in its confirmed state have developed themselves, all our efforts at checking its further and fatal progress will too often be of no avail.

Dr. Gooch has described a peculiar state of the brain occurring in infants which has usually, but erroneously, been attributed to congestion of this organ; whereas it seems really to depend on the very opposite state, or a deficiency of blood in it. It is in children of from two months to two or three years old that it usually makes its appearance, and generally in such as are small and delicate, and have been exposed to some previous debilitating cause. The leading symptoms consist in heaviness of the head, drowsiness, and languor. There is an absence of heat and of all the symptoms of fever, the skin being occasionally even colder than natural. The tongue is slightly white, and a transient flush at times passes over the cheek. There are no signs of pain. Under the antiphlogistic treatment usually pursued in acute hydrocephalus, consisting of leeches, cold applications, purgatives, and especially calomel, all the symptoms become aggravated, the child growing colder and more languid, the pulse quicker and weaker, and death by exhaustion takes place after a few days; whilst, on the contrary, several have recovered under the use of an abundant supply of light nourishment, and the cautious employment of ammonia and other stimulants. In two cases only did he observe symptoms of oppressed brain, coma, stertor, dilated and motionless pupils; and this was only for the last few hours before the fatal termination.

On dissection, the brain is found pale and bloodless, with no other morbid appearance than perhaps an increased quantity of serum in the ventricles. The late Dr. Armstrong has applied to an affection in many respects very like that just described, the name of "hydrocephalus from venous congestion;" whilst by Dr. Darwall it has been called asthenic hydrocephalus.

The disease, however, to which the term hydrocephalus is, by the majority of writers of the present day, conventionally restricted, is so different from this passive effusion, as well in most of its symptoms as in the treatment which it requires, and in the morbid condition of the brain discovered after death, that no benefit, we think, can arise from comprising both under the same name. The term, in regard to its derivation, is, we admit, equally applicable to each; but this only shows the impropriety of having named them, not from any thing essential, but from an effusion which may be present or absent in both, and is consequently characteristic of neither.

The above described morbid condition in infants has also been noticed by Dr. Marshall Hall, who was generally able to trace it to the diarrhoea of weaning, or to leeching for some previous complaint, or some other cause of exhaustion. He too, like Gooch, believes that it is often mistaken for "hydrancephalus, or inflammation of the brain." There is at first, according to his observation, great restlessness with irritability of temper, pale and anxious countenance, and frequent pulse; dozing and deceptive appearances of amendment succeed; but the pulse continues to rise, the cheeks and the extremities grow cold, the voice and cough husky, and the patient soon sinks exhausted;—a termination which may, however, be often averted by a proper supply of nourishment and a cordial soothing plan of treatment. Dr. Abercrombie, in like manner, in the last stage of diseases of exhaustion has seen both adults and children, but especially the latter, fall into a state resembling coma for a considerable time before death; the pulse still continuing to be distinctly felt, though feeble; the face pale, the pupils dilated, and the eyes open, but insensible. He has known children, after lying for a day or two in this kind of stupor, recover under the use of wine and nourishment. This state, which seems to correspond very nearly to the apoplexia ab inanitione of the older writers, is supposed by Dr. Gooch to consist in impairment of the nervous energy, or deficient cerebral circulation. Profuse hemorrhage is well known to be capable of producing dilatation of the pupil and blindness; and when animals are bled to death, convulsions very usually occur, and more or less serous effusion takes place in the brain, as appears from the experiments of Dr. Leeds.

Appearances on dissection.—There is sometimes, in consequence of previous inflammation and adhesion, considerable difficulty in separating the skull-cap from the dura mater, and the former is occasionally thinner, more trans-

parent, and of a bluer colour than usual. When we come to examine the state of the parts within the cranium after death, we usually find the vessels on the surface of the brain in a state of considerable congestion. A network of florid vessels is occasionally observed in the pia mater, and even patches of extravasated blood, indicative of high inflammatory action, are occasionally detected. This membrane at times also adheres more strongly than natural to the brain. An effusion of serum underneath the arachnoid, and filling the space between the convolutions, is very frequently observed. When it is considerable in quantity and of a yellowish hue, it might be mistaken by a superficial observer for a gelatinous effusion. In some instances it has a sero-sanguinolent character. Opacity and thickening of the arachnoid membrane, and depositions of coagulable lymph, or more rarely of puriform matter on its surface, or between it and the pia mater, are amongst the more commonly observed morbid appearances, and prove unequivocally the inflammatory nature of the affection. These occur especially at the base of the brain, about the pons varolii and decussation of the optic nerves. That these and many other characteristic morbid appearances should have escaped observation in the slovenly manner in which the brain used too often to be examined by slicing it from above downwards in situ, is not wonderful. Before commencing the dissection of the brain itself, it ought to be removed altogether from the skull and inverted into a plate, so as to enable us accurately to examine the important parts at its base.

Adhesions between the opposite surfaces of the arachnoid through the medium of false membrane, are sometimes, though rarely, observed. The arachnoid is occasionally covered, especially when it lines the ventricles, with minute granulations, which give it a rough appearance. They are probably one of the many forms which the effused coagulable lymph assumes, and require a good light for their detection. We must not confound with these granulations the bubbles of air which at times exist beneath the pia mater, and which may be distinguished by their vanishing on raising this membrane.

The mass of the brain itself, in some rare instances, has appeared evidently infiltrated with serosity. Gólis mentions such a case, in which the fluid could be expressed from the cerebral substance as if from a sponge; and Cheyne also has noticed this appearance of increased moisture on making sections of the organ.

A frequent appearance is that of an unusual number of bloody points in the cut surface of the brain, indicating a considerable increase in its vascularity.

The substance of the brain in acute hydrocephalus is generally softer than natural; and this is especially observable towards the central parts. Yet in some cases, and especially in those which run a very rapid course, it is found to have retained its usual firmness.

In most instances the ventricles contain a considerable quantity of fluid, which is usually more limpid than that found in the other serous cavities. Sometimes, however, it presents a turbid, whey-like, or puriform appearance, with shreds of coagulable lymph floating in it, as well as lining the walls of the ventricles; and this is particularly the case in the most acute and rapid examples of the disease. The existence of a fluid may often be predicted before we have punctured the ventricles, from the feeling of fluctuation communicated to the finger applied to the surface of the hemispheres, as well as from the flattening of the convolutions. The quantity of water varies from a few tea-spoonfuls to seven or eight ounces: four or five ounces may be stated as the average. Of this the greater part is contained in the lateral ventricles, the posterior horns being usually much enlarged, and the anterior portion of the fornix elevated so as to make the opening of communication very free with the third ventricle, in which, as well as in the fourth, and in some very rare instances also between the layers of the septum lucidum, the effused fluid is likewise found. The choroid plexus is very generally remarkably pale. Small vesicles, not unlike hydatids, are occasionally found attached to the pia mater; and we have seen such adhering to the choroid plexus. They seem to owe their origin merely to a circumscribed sub-arachnoid infiltration; the serous membrane being detached by the effusion at a given point, and distended into a small cyst.

The septum lucidum, the fornix, and other parts forming the walls of the ventricles, are often found in a state of softening, being of a pulpy or occasionally even of a creamy consistence, whilst the lining membrane of these cavities displays equal evidence of inflammation by its opacity, as well as by the layers of coagulable lymph with which it is at times overspread. A lacerated opening in the septum lucidum occasionally exists, and forms a new and unnatural communication between the lateral ventricles. We have seen the infundibulum and the cellular membrane in the structure of the pituitary gland distended with serous effusion into the form of a little bladder. This, by its direct pressure on the optic nerves, in addition to that to which they are exposed from the lymph effused at the base of the brain, and from the dilatation of the ventricles, must tend to complete the derangement of the functions of vision.

Laennec has spoken of minute tubercular granulations dispersed through the brain, and discoverable by a careful microscopic examination; but as their existence has not been confirmed by subsequent observers, it is probable they are at most only a casual occurrence.

Other morbid appearances, of a date anterior to the hydrocephalus, and occasionally, no doubt, its cause, such as tubercles or abscesses in the brain, caries of the petrous portion of the temporal bone, &c. not unfrequently co-exist, and should be carefully sought for.

With regard to the nature of the effused fluid, it differs somewhat from that found in the other serous cavities, being for the most part not coagulable by heat or acids; this is, however, by no means universally the case, a slight coagulation having in some instances been detected by Dr. Baillie, Dr. Blackall, and others. It has been carefully analysed by Marcet. Of 1000 parts operated on, 990·80 were water; 1·12 muco-extractive matter, with a trace of albumen; 6·64 muriate of soda; 1·24 sub-carbonate of soda, with a vestige of an alkaline sulphate; ·20 phosphate of lime, with traces of phosphate of magnesia and of iron. Acids or heat, according to this chemist, did not produce any decided coagulation.

It has been already stated that abdominal affections often complicate hydrocephalus, that they frequently precede it, and are probably not very rarely its exciting cause. On dissection, unequivocal examples of disease in the viscera of the abdomen have been detected in too many cases to be considered a mere casual coincidence. Thus the liver has been found enlarged, and presenting evident traces of inflammation on its surface, and adhering through the medium of organised lymph to the neighbouring parts. Tubercles on its surface or in its substance, as well as in that of the spleen and mesenteric glands, are occasionally observed. We have found the mucous membrane of the stomach and intestines inflamed, and the patches of Peyer's gland much developed, and such firm contraction of the intestinal tube as to give it in parts the appearance of a solid chord. This spasmodic state, when existing in the large intestines, enables us to account for the great difficulty which sometimes attends the administration of enemata during the latter part of the disease. We have likewise met with intus-susception of the small intestines, an appearance which has been alluded to by several writers on the disease. The spasmodic state of the intestines which is thus evinced is probably in some degree analogous to the convulsive actions in the voluntary muscles, and takes place like them under the influence of the morbid state of the brain; at least, they do not seem to be attributable solely to the irritation in the mucous membrane, both because such extreme contraction is not usually observed in instances of uncomplicated inflammation of this membrane, and because we have found it greatest in those parts of the intestines which presented least appearance of inflammation. We have noticed a similar constriction of this canal after death by tetanus, where there existed no inflammation of the intestines.

The peculiar green colour of the stools in hydrocephalus has been attributed to their union with morbid bile. We were first led to entertain doubts of this opinion being universally correct, and to ascribe the appearance in question rather to a morbid secretion from the glands of the intestines themselves, by observing that the peculiar porraceous tinge was not acquired in perfection till the feces had reached the lower part of the small intestines, the

contents of the upper portion being of a pale drab colour, whilst the bile in the gall-bladder was of a yellow colour, and without any tinge of green.

The assertions of Dr. Cheyne as to the frequency of disease in the liver and intestines have been corroborated by the subsequent observations of Dr. A. T. Thomson, Mr. Cooke, and others. In eleven dissections of patients dead of this disease, Dr. Thomson found traces of inflammation of the liver in nine, inflammation of the colon in the tenth, and intus-susception of the jejunum in the remaining one; whilst in three out of Mr. Cooke's four cases the liver was found diseased. Dr. Wilson Philip's experience leads him to the conclusion that five out of six cases of hydrocephalus arise out of the derangement of the digestive organs; and Abernethy has mentioned three cases of hydrocephalus in all of which the liver and bowels were notably diseased.

Though evident traces of inflammation in the brain or its membranes are detected in a very large proportion of cases, yet there are a few in which a trifling effusion of serum in the ventricles or under the arachnoid is the only morbid appearance discoverable; there being neither congestion of the vessels nor effusion of coagulable lymph, nor softening of the central parts of the brain, the whole organ being as firm and perhaps even paler than in its natural state. Such is, as we have already stated, usually found to be the case in infants who have died with the symptoms of passive effusion previously described. M. Brichteau, in the *Archives Générales* for the year 1824, has described a case where most of the usual symptoms of hydrocephalus had existed; and yet, on dissection, a limpid serous fluid in the ventricles was almost the only thing detected, and was not by him thought to be the result of inflammatory action: by many, however, we believe it would have been considered as an instance of low inflammation in the arachnoid. Of late years, since pathological investigations have been conducted in a more careful and methodical manner, it has been much more rare to hear of cases which, having possessed the whole assemblage of symptoms characteristic of acute hydrocephalus, yet present on dissection no indubitable marks of inflammatory action. Guersent candidly confesses that amongst his earlier dissections he has notes of many such cases in which no allusion to inflammatory appearances is made; but that, as he became more accurate in his mode of examining the brain, the instances in which proofs of their existence could not be detected became infinitely rarer.

Theories of the disease.—The uncertainty which has prevailed as to the true nature of acute hydrocephalus has given rise to a corresponding diversity of opinion as to the appropriate place for it in systems of nosology. It was long confounded with apoplexy, till Whytt, by a closer investigation of its symptoms, became convinced that it was much more nearly allied to chronic hydrocephalus. Cullen, who at first classed it along with

chronic hydrocephalus, in a later edition of his nosology made it a species of apoplexy, under the name of apoplexia hydrocephalica. By Macbride it was placed along with fevers, under the name of febris nervosa hydrocephalica; and a similar view of it was taken by Pinel in the earlier editions of his *Nosographie Philosophique*, in which it bears the name of cerebral fever; but he subsequently restored it to its old place amongst the dropsies: there is however, usually no evidence of any dropsical diathesis, effusion into the other cavities, or swelling of the face or limbs, scarcely ever co-existing with it. The investigation of the disease by Quin and Rush, proceeding on the basis of pathological anatomy, the only solid groundwork of nosological arrangement, led to a more correct conception of its nature, and demonstrated its affinity in the great majority of instances to the phlegmasiæ. Subsequent inquiries, both in this country and on the continent, have tended to confirm the justice of this manner of considering the subject, and have proved that the effusion is almost always a secondary phenomenon occurring in connection with obvious morbid changes in the brain or its membranes, and in a very large proportion of cases demonstrably the results of inflammation. So fully convinced is Rostan of the effusion being always consecutive to cerebral or meningeal lesions, and never constituting an essentially distinct disease, that he proposes that the term hydrocephalus should be altogether expunged from our tables of nosology. As the effusion and other morbid appearances are such as to indicate inflammation of the serous membrane, the disease has been treated of by several foreign writers under the head of arachnitis of the ventricles and base of the brain; whilst others, conceiving that inflammation of the cerebral structure itself often precedes that of the membranes, have referred its symptoms to the head of cephalitis. Thus, by Conradi it is called "encephalitis exsudatoria infantilis," and by Coindet, "cephalite interne hydrencéphalique."

That the effusion does not constitute the most important feature in the disease, and that it is not indispensable to the production of any of the symptoms which characterise hydrocephalus, we have a double proof; first, in the occasional absence of these symptoms where effusion to a considerable extent is detected on dissection; and secondly, in their being sometimes present, and that in a very marked degree, when an examination of the brain after death has shown that no effusion had yet taken place. There is sometimes even reason to think that the inflammatory tension is temporarily relieved by this increased action of the exhalant vessels: this can, however, be the case in those instances only where the effusion is moderate. Where it takes place rapidly, and to a considerable excess, it cannot fail to add still further to the derangement of the cerebral functions, and to manifest its presence by symptoms indicative of compression under some circumstances, and of irritation under others. We cannot, therefore, concur

in opinion with a late writer, who supposes that the increasing fluid, by stimulating the brain, may occasionally answer a beneficial purpose, and give rise to that momentary recovery of the senses and of the intellect which so often takes place before the fatal termination. Such fleeting and fallacious indications of improvement in the state of the cerebral functions should perhaps rather be attributed to a temporary diminution in the quantity of water in the ventricles under a casually increased action of the absorbing vessels. This partial re-absorption of the aqueous effusion some time previous to death is rendered probable by the instances of a similar diminution of effused fluid in the extremities and other parts of the body lying open to our observations being by no means rare in dropsical subjects at this period. It is only to some change in the state of the effused fluids, or of the circulation within the brain, that we can look for an explanation of this fact; for as to the alterations of structure and consistency which have occurred in any portion of the cerebral mass or its membranes, it is inconceivable that they should undergo any sufficiently rapid modification to account for it. As to the presence of absorbing vessels in the brain, so long a subject of dispute, the changes which are now so well known to take place in the apoplectic coagulum cannot leave a doubt. The occasional diminution of the effused fluid in chronic hydrocephalus under the influence of pressure or other methods of treatment, is also conclusive on the same point. Indeed the analogies in favour of the existence of such vessels within the brain are so strong, that it seems wonderful that there ever should have been any scepticism on the subject. It is altogether inconceivable that the fluid, which even in a state of health always lubricates the serous cavities within the cranium, should, unlike that in the thorax or abdomen, be stagnant and incapable of removal. Cheyne suggests that the effused fluid may answer the useful purpose of supplying the place of the cerebral matter removed by absorption, thus giving support to the brain, and enabling it in some degree to continue its functions; and hence he conceives that any sudden withdrawal of the water, so far from being desirable, might even have a fatal effect.

Morgagni was one of the first pathological anatomists who pointed out the very frequent dependence of effusion on organic disease of the brain; and Portal has likewise long since insisted on the very secondary importance of the latter in determining the indications of cure. The belief in the inflammatory nature of hydrocephalus, since it was first promulgated by Quin and Rush, has been slowly but steadily making its way both in this and all other countries where medical theories are in any degree under the influence of morbid anatomy. Dr. Garnett argued in favour of this view of the disease from the buffy state of the blood, the acuteness of the pain, the character of the pulse, the benefit received from antiphlogistic measures early employed, as well as from the aggravation en-

suing upon the use of stimulants, and finally from the appearances found on dissection. Similar views were followed up with great industry and ability by Dr. Cheyne, who showed that the opinion of Fothergill, who attributed the effusion to the rupture of a lymphatic vessel in the brain, as well as that of Whytt, who ascribed it to a watery state of the blood, or to a laxity of the exhalents, and that of Darwin, who thought it consisted in a debility of the absorbent vessels, were all hypothetical and untenable; whilst he proved by numerous carefully made dissections that dropsical effusion here, as in so many other cases, is, to use the language of Heberden, not so much a disease in itself as a symptom of one. The opinion of Cheyne seems to be, that hydrocephalus owes its origin in the first instance to inflammation; that this gives rise to a morbid accumulation of blood in the head or venous congestion; and that effusion is the ultimate result. Occasionally the concatenation of morbid actions can be traced still farther back: thus there is often, first, disease of a distant part, then increased irritability, which is soon attended by increased arterial action, absorption of the substance of the brain, venous congestion, and finally effusion. "There is no proof whatever," says the above-named writer, "that the effusion into the ventricles is the cause of any of the violent symptoms."

The greater or less quantity of fluid found in the ventricles in acute hydrocephalus seems to depend on the length of time which the patient has continued to live after the commencement of the second stage. Though the state of the disease may undergo some modification by the occurrence of effusion, yet there is much reason to believe that some degree of inflammation exists to the very end. Cheyne, although a strong advocate for the inflammatory nature of hydrocephalus, by no means goes the length of Dr. Rush, so as to believe it merely a modification of phrenitis. He points out, on the contrary, with his usual accuracy, many striking marks of distinction between the two diseases, deduced from their causes and symptoms, from the ages respectively prone to each, as well as from the morbid appearances found after death. "Hydrocephalus," he concludes, "appears to consist in a diseased action of a peculiar kind, but of what kind we can as little explain as we can the nature of the serofulous or syphilitic action."

According to Abercrombie, hydrocephalus is originally an inflammatory affection; in its most ordinary form seated chiefly in the substance of the central portions of the brain, and terminating generally in ramollissement of those parts, combined with serous effusion into the ventricles. It may, however, prove fatal, and have all the symptoms commonly considered as those of hydrocephalus, without any effusion. Thus we occasionally observe coma of long continuance, though on dissection no such cause of it is detected; and on the other hand, effusion has been unexpectedly found though coma had never manifested itself. Again, even when this symptom does exist, it

may sometimes be entirely removed by purgatives and other antiphlogistic measures, and yet the disease proceed uninterruptedly to its fatal termination. In the cases which have been published by the same able physician, we meet with every variety in the state of the pulse, the vision, and the intellectual functions; so that we can obtain from none of these sources indubitable evidence of effusion having taken place. Though inflammation of the central parts of the brain constitutes the most frequent modification of hydrocephalus, he admits that it may take place in connexion with inflammation of other parts of this organ, or of the membranes which envelop it. He has noted but two instances in which he did not succeed in demonstrating other inflammatory appearances besides the effusion of serum; and in these the disease presented itself in the most insidious and chronic form, and offered a remarkable contrast to the active symptoms of what he considers the usual species of the disease. As to the serum, he believes, that even though it were absorbed, the patient's condition would be little improved, as the softening or disorganization of the brain would remain behind. In a word, the coma and other symptoms of hydrocephalus are the effect, not of the effusion, but of that morbid condition of the brain of which it is itself the consequence.

Lallemand conceives that the inflammation in hydrocephalus may commence either in the cerebral substance, and subsequently extend to the membranes of the brain, and thus induce effusion; or, on the other hand, begin in the arachnoid, and extend, after a longer or shorter period, to the brain; but of these two origins he considers the latter by much the most frequent. In their earlier stages he believes that they may often be distinguished from each other. The possibility of their commencing simultaneously in some cases, in both these parts, under the influence of a common cause, must not, however, be forgotten. Inflammation of the membranes, according to Lallemand, is characterised by restlessness, insensibility, convulsive affections and delirium; whilst that of the cerebral substance itself may be recognised by the gradually extending paralysis, the rigidity and pains in the limbs, together with the impairment of the memory and intellect. Inflammation of the brain itself has a rapid progress, and is speedily mortal. Hence, when the symptoms of hydrocephalus depend on inflammation of the cerebral substance, they are more severe, and the disease runs a shorter course. In several cases such inflammation has existed in the septum lucidum, fornix, and other central parts of the brain, without extending to the arachnoid where it lines the ventricles, and consequently without effusion, and yet all the symptoms of hydrocephalus have been present. Hence, he argues, it is highly probable that even in those other cases where effusion does exist, it has much less concern than the state of the neighbouring parts in producing the characteristic symptoms of the disease. From erroneous views on this subject too little attention has, he thinks, been paid in

the treatment to the ramollissement, and the efforts of practitioners have been too exclusively directed to promoting the absorption of the effused fluid.

The investigations of MM. Martinet and Parent-Duchâtelet have shewn that inflammation of the arachnoid at the base of the brain is much more common in infancy than in adults. In the latter, inflammation of this membrane occurs more frequently in that portion of it which covers the upper and lateral parts of the hemispheres, and is characterized at first by delirium, to which a soporose state, and at length coma, succeed; whereas in the arachnitis of infants there is a greater tendency to convulsive affections and less to delirium.

The inflammatory nature of the great majority of cases of hydrocephalus has also been recognized in its fullest extent by Gölis, Conradi, and almost all of the German pathologists of the present day. Formey, however, a very respectable authority, thinks that the frequency of effusion into the ventricles during childhood depends not on inflammation, but merely on a state of increased activity in the vessels of the brain, which accompanies its rapid and premature development; but Raimann with much reason believes that in addition to this state, the existence of true inflammation, either of an acute or chronic kind, is indispensable.

Causes.—Of the predisposing causes, the period of life seems to be one of the most influential; hydrocephalus being very much more frequent during infancy and childhood than at any subsequent period. The rapid evolution which the brain is then undergoing, and the great proportion of blood sent to the head, appear to be the causes of the peculiar tendency to cerebral inflammation which characterizes this age. The more early and rapid the development of the cerebral organs, the greater is the risk of hydrocephalus. Its connexion with precocity of intellect is indeed matter of daily observation, and large-headed children are generally found to be the most subject to the disease. The latter fact, indeed, is doubted by Underwood, but both Gardien and Guersent confirm the popular opinion. The greatest number of cases appear from the tables of Percival and of Brichteau to occur between the second and fifth year; but at the same time it is not infrequent in infants at the breast, or, indeed, in children of any age up to the twelfth or fourteenth year: after this period it is less common. A scrofulous habit predisposes strongly to the disease. The greatest number of cases occur in constitutions evidently of this kind. When a strumous tendency exists, all the children of a family have been known to be thus swept off in succession as they approached a certain age. Hydrocephalus and scrofulous affections seem to be mutually convertible into each other, the disappearance of scrofulous disease of the glands or joints being frequently followed by the development of hydrocephalus; while, on the other hand, all the symptoms of confirmed phthisis have been known to vanish on the occurrence of the latter affection. The disease has usually been thought to take place

most frequently in children with a fair skin and hair, pink complexion, and blue eyes. Cheyne, however, says that he has seen it oftener in those with dark eyes and dark complexion. As scrofula occurs pretty equally in both these temperaments, it is probable that hydrocephalus also is nearly as frequent in the one as in the other.

Disorders of the digestive or respiratory organs, difficult dentition, scarlatina, measles, and other diseases which induce debility or excite febrile action in the system, may, according to the intensity of their action, be placed either amongst the predisposing or the exciting causes. The frequent and indiscriminate use of calomel in children's complaints has been accused by Blackall of predisposing to the disease. This, however, can apply only to the abuse of this remedy: judiciously employed it is of the greatest utility in cutting short such indisposition as might, if neglected, terminate in hydrocephalus. The pernicious habit practised by some unprincipled nurses, of giving narcotics to infants in order to quiet them and render them less troublesome—a practice which cannot fail to derange the functions both of the digestive organs and of the brain,—has been noticed as an occasional cause of this affection. Belladonna, which is much and advantageously employed in Germany as a remedy in whooping-cough, and also as a preventive of scarlet fever, has sometimes, in imprudent hands, led to inflammation and effusion within the cranium. We have seen hydrocephalus apparently induced by the abominable custom, unfortunately not very uncommon amongst the lower classes, of giving spirits to children.

Great terror and anxiety in the mother during the last months of pregnancy has been placed by Gölis in the list of predisposing causes, in support of which he adduces the fact, that a great proportion of the children born soon after the bombardment of Vienna by the French in 1809, were seized with convulsions within a month after their birth, and died of inflammation within the cranium; effusion of coagulable lymph on the membranes, and of serum in the ventricles, being discovered on dissection. The same writer conceives that the frequent exhibition of emetics in catarrhal or other affections may occasionally lead to the disease in scrofulous children. We are not aware, however, that any facts in confirmation of these opinions have been observed in this country.

To the list of exciting causes enumerated above, we may add external injuries, such as falls or blows on the head, the extension of inflammation from the external ear to the brain. The sudden suppression of accustomed discharges, or drying-up of sores behind the ears or eruptions about the head, without an appropriate modification of the diet, or the simultaneous employment of suitable evacuations, are also amongst its occasional causes. However erroneous may have been the explanation of the facts afforded by the humoral pathology, their reality and importance are indubitable, and will be least questioned by those who have attended the most closely to the powerful in-

fluence of counter-irritation in controlling morbid determinations of blood to internal organs, and in subduing their tendency to inflammation.

Treatment.—The chances of success in the treatment of hydrocephalus depend in a great measure on the period at which it is detected. It is during the precursory symptoms, or the commencement of the inflammatory stage alone, that the influence of remedial measures can be reckoned on with any thing like confidence. It may be said that at so early a period we can have no certainty of the disease being actually incipient hydrocephalus; in dubious cases, however, it is infinitely more reasonable to assume the affirmative, and take our measures as if the presence of this formidable affection were fully ascertained, than to remain inactive spectators of its progress till the disease has assumed an unequivocal and comparatively hopeless character. When a family has already lost one or more of its number by this disorder, the recurrence of a precisely similar set of initiatory symptoms in any of the remaining children renders an active mode of proceeding doubly incumbent. Under the head of prognosis it has been already stated that cases in every stage of the disease have, under active and judicious modes of treatment, been brought to a favourable termination; and this is sufficient to show that trifling in the commencement, or despondency and the want of energy and perseverance to which it gives rise in the advanced stages of the complaint, are equally unjustifiable. There is too much reason to apprehend that many children have fallen victims, not so much to the incurable nature of their case, as to the indecision of their medical attendant.

The precursory stage being very commonly marked by derangement in the action of the intestines, and interruption or perversion of the biliary secretion, the employment of active purgatives, of which mercury should form a part, is almost always indicated; and we should persevere in their use with the double object of rendering the evacuations natural, and relieving the uneasiness in the head.

Where the threatening symptoms have taken their rise soon after an injury of the head, though it may have been of a slight nature, and the effects be as yet trifling, the employment of venesection, or the application of a few leeches to the temples as a precautionary measure, is advisable, in addition to the use of aperients and a reduction of the ordinary diet.

Where the symptoms in the head undergo no favourable change, though the bowels have been freely acted on, the probability of disease having become established within the brain becomes hourly stronger, and more energetic measures must immediately be had recourse to. The chief indications in hydrocephalus are to reduce the force of the cerebral circulation; to obviate all sources of irritation, whether originating in the abdominal organs or elsewhere, which might re-act on the brain, and thus aggravate, if they did not give origin to, the disease; to alleviate pain, vomiting, and convulsions, even where we fail in

removing their cause; to support the strength in the advanced period of the disease; and finally, when death seems inevitable, to render its approaches as easy as possible. For fulfilling the first and most important of these indications, our chief resources are to be found in the antiphlogistic class of remedies. Bloodletting, active and repeated purgation, cold applications, mercury, and blisters, are amongst the most accredited remedial agents, and are here arranged nearly in the order of their relative efficacy. The mode of employing these, as well as some additional therapeutic means, remains to be considered.

Bloodletting.—The advantage of early bloodletting in hydrocephalus is more generally agreed upon than that of any other measure whatsoever. The importance of the brain to all the functions of life, and the unyielding nature of the parietes of the cavity in which it is contained, show us, when conjointly considered, how the effusion, which in many other situations is the natural cure of inflammation, must within the cranium, if it proceed to any extent, be attended with extreme danger. The only safe termination to inflammation here is in resolution; and to effect this, free, early, and in some cases repeated abstraction of blood must be had recourse to. Opening the temporal artery, or copious venesection, either in the arm, or perhaps better still, in the jugular vein, often affords immediate relief to the headach, reduces the fever, and causes purgatives and mercurials to act with greater readiness and efficacy. Dr. Rush practised bleeding in this disease at least as largely as in phrenitis; and the activity of his practice has been equalled or surpassed by that of Dr. Maxwell of Dumfries, with the remarkable result of sixty recovering out of ninety cases, or two-thirds of the whole. The child being placed in the horizontal posture, Dr. Maxwell opens the jugular vein, and stops it from time to time with the finger, so as to prevent syncope taking place, till a very considerable quantity of blood has been obtained; the bleeding is allowed to go on till the pulse altogether disappears: a state of insensibility ensues, and occasionally continues for some hours afterwards. The disease is said to be often immediately arrested by the shock which is thus given to the circulation. But the possibility of death occurring under the very hands of the operator will probably prevent most persons from imitating this bold proceeding: besides, some doubts might be raised even as to the principle on which it is performed being physiologically correct or universally applicable, as excessive losses of blood are known, as already stated, to induce convulsions and effusion even in healthy subjects. The experience of no single individual, however extensive it may be, is sufficient to establish the propriety of such a practice; and certainly the great debility which exists in so many cases of hydrocephalus, seems often strongly to counter-indicate such an extreme measure. Except when the attack is of the very violent kind, with high fever, a strong pulse, and extreme pain and restlessness, the majority of practitioners are satisfied with a

single bleeding, and trust subsequently to the repeated application of leeches or to cupping. Cheyne is an advocate for early bloodletting in most infantile fevers of a suspicious character, attended with great irritability of stomach, tumid hypochondria, or suppression of the secretions. He has also adduced evidence of the utility of a moderate bleeding even in the advanced period of hydrocephalus, when pain of the head and vomiting continue to be predominant symptoms; at the same time he is convinced of the inadequacy of this measure singly to subdue the disease at any period of its progress, and believes that its repetition is even at times not unattended with hazard. The pulse must, however, be our guide, as, if it rises in strength, and the symptoms continue or recur, blood may again be abstracted with safety and advantage. By Abercrombie also, venesection is employed in the most decided manner in the acuter forms of the disease; whilst he admits that in those which assume a more chronic character, it has much less control over the disease, and cannot be borne to the same extent. Bloodletting seems to have been practised in some of his cases, and with occasional good effect, even after the occurrence of the slow, varying, and weak pulse of the second stage. The French practitioners generally trust almost exclusively to the free abstraction of blood in the earlier stages of this complaint; and some of them prefer taking it from a vein in the lower extremities, instead of from the arm or jugular vein; but we are not aware that any decisive proofs of the superiority of this mode of bleeding, which is gone into very general disuse in our own country, have been adduced.

Bloodletting has, however, its opponents as well as its advocates, but they are comparatively few in number. Dr. Garnett was averse to the employment of general bloodletting in children labouring under hydrocephalus; and even in adults he usually gave the preference to the local abstraction of blood, both because it appeared to him to exert more influence over the local inflammation, and because he thought it less likely to add to the debility which comes on in the course of the disease. Similar views of the relative value of local and general bloodletting are entertained also by Dr. Porter of Bristol. Such is not, however, the general opinion of the profession; and on a review of such cases as have fallen under our own observation, we have sometimes seen cause to regret that general bloodletting had not been earlier performed, or carried far enough, but never the reverse. That this as well as every other measure will, in a very great proportion of cases, prove ineffectual, we readily admit, as we do not participate in opinion with those who think that hydrocephalic inflammation is always as capable of being subdued by active antiphlogistic treatment, as that induced by injuries of the head in adults, which usually falls under the care of the surgeon. The predisposition and debility of constitution which often exist in the former, render the cases, in many instances at least, widely different.

As to the quantity of blood which may be

taken from infants with safety, the most specific directions are those furnished us by the late Dr. John Clarke: his extensive experience led him to the important conclusion that very young children bear well the loss of blood even to fainting, once or twice repeated; whilst on the other hand their powers are apt to sink if it be more frequently had recourse to. Children of four years old and upwards can, however, support the repeated performance of venesection with impunity. In infants of only a year old the jugular vein may often be opened without difficulty. At this period of life three ounces may be considered a full bleeding, and nearly the same quantity may again be taken away in twelve hours afterwards, if the symptoms seem to demand it, and the weakness is not too great. Where blood could not be obtained from a vein, Dr. Clarke gave cupping from the nape of the neck the preference to leeches. Local and general bloodletting should usually go hand in hand. Where the latter measure is, from the age of the child or any other cause, inapplicable, or has already been carried as far as is prudent, it is to cupping from the nape of the neck or to leeches that we must chiefly trust. For an infant of six months old, from four to six leeches, according to the strength of the child and the violence of the symptoms, may be once or oftener applied either to the temples or behind the ears, to the angle of the jaw, or to the nape of the neck; perhaps the latter situation, from its proximity to the medulla oblongata and base of the brain, may deserve the preference. Kuhn recommends their application to the inner angle of the eye, probably with a view to more directly unloading the cerebral vessels. When there is pain, tenderness on pressure, or fullness in the region of the stomach or liver, the application of leeches to these parts should not be neglected.

Purgatives.—Remedies of this class are exhibited in hydrocephalus with the double view of improving the secretions of the mucous membrane and liver, and thus removing one evident source of irritation, and also of producing derivation from the head, and diminishing the quantity of the circulating fluids. By means of calomel given in combination with jalap or compound powder of scammony, or, if these are found to irritate too much, with rhubarb, we shall generally succeed in procuring evacuations. At first these medicines may require to be aided by the occasional interposition of saline purgatives with the infusion of senna, which have the additional advantage of producing abundant watery secretions. Purgings actively seems to Abercrombie to be the remedy which is of the most importance in all the forms of the disease; and though he sets a due value on the aid of venesection, he believes that more recoveries from head affections take place under the use of very strong purgatives than under any other mode of treatment whatever. He has found the croton oil one of the most convenient and effectual cathartics in diseases of this kind, which are so often accompanied by great obstinacy of the bowels. Whytt never saw

even temporary relief of the symptoms produced by any other means than those which increased the evacuations; and Rush was likewise a strenuous advocate for the employment of medicines of this kind. It is chiefly at the commencement of the disease that active purgatives are proper; but even here there are limits and exceptions to their use. Where there is a high degree of irritability of the mucous membrane of the stomach or intestines, they will be useless or even injurious till these states have been subdued by blood-letting in some of its forms. When in a high state of excitement, we shall often attempt in vain to force the secretions of the liver or mucous membrane; and to procure healthy evacuations under such circumstances is quite out of the question. When the usual purgatives seem to aggravate the vomiting without moving the bowels, or when they produce only mucous stools attended with much irritation, a perseverance in their use cannot fail to be prejudicial. When the commoner purgatives have been rejected by the stomach, or proved insufficient, Dr. Cheyne occasionally succeeded in quieting the stomach and procuring evacuations, by giving a drachm or two of magnesia saturated with lemon juice every second or third hour, venesection to an adequate extent having been usually premised. In other cases he postponed the use of aperients till the state of the secreting organs had been first modified, and some appearance of feculent matter could be observed in the stools, under the influence of a combination of calomel, opium, and antimony. Besides, we must always bear in mind that the local irritation which the excessive or untimely employment of cathartics is capable of producing, cannot fail to re-act on the head, and aggravate instead of relieving the hydrocephalic symptoms. So great, however, is the torpor of the intestinal canal in most instances, that such cases are, perhaps, only to be looked upon as the exceptions. We cannot agree with Dr. Porter in condemning active purgation as an inefficient measure, even were his hypothesis granted, namely, that the derangement of the abdominal organs is always secondary, and merely symptomatic of the cerebral disorder.

Purgatives should have a fair trial in conjunction with other antiphlogistic measures during the commencement of the disease; after which, if they do not appear to be making any decided impression on it, the mercurial plan of treatment may be resorted to, a laxative enema or an aperient medicine being still occasionally exhibited. A large glyster of broth, with some of the purgative salts in solution, repeated frequently in the course of the day, has been found a useful palliative by Cheyne, the child lying at ease for a considerable time after its exhibition. Its good effect is attributable partly to its soothing influence, and partly to its protecting the intestines from the irritating qualities of the morbid fæces.

Cold applications.—The increased activity of the circulation within the brain may be

controlled in a considerable degree by the long-continued application of cold to the shaven scalp, which may be effected either by means of cloths kept constantly wet with cold water, or evaporating lotions containing spirits and ether; or more effectually still, by means of a bladder containing pounded ice mixed with water, kept in constant contact with the forehead, temples, and upper part of the head. This measure, in conjunction with an erect position of the head and trunk, persevered in for many days together, has been known to exert a surprising influence over inflammation of the brain both in adults and children. But the most efficient method of all consists in directing a stream of cold water against the crown of the head, and continuing it for some moments, till its full effect is produced. This is so very powerful a means of reducing cerebral action, as to demand much circumspection in its employment; and it is chiefly applicable to the more violent examples of the disease. To Burns it appears a measure of rather doubtful propriety, as it is often followed by alarming collapse: he thinks that it is only in the early part of the disease, when there is much heat, and when adequate evacuations have been already premised, that its employment can be safe. Abercrombie, while he admits that its use requires discretion, is a strenuous advocate for its utility in hydrocephalus, and has likewise employed it with great success in sudden coma connected with congestion of the head, and in the convulsive affections of children, in which last it is more effectual and much more generally applicable than the warm bath. Dr. Darwall has known cases which seemed utterly hopeless recover by letting water drop in a small stream upon the scalp, and continuing it till the head no longer recovered its high temperature on intermitting the stream; and Forney thinks it, when repeated every two hours for several days and nights consecutively, the most effectual remedy we possess both in the inflammatory stage and in that of effusion.

Mercury.—It is now nearly fifty years since the first recommendation of mercurials in hydrocephalus by Dr. Dobson; but though they have formed a part of the standard treatment of the disease during all the intervening period, the mind of the profession is still far from being made up, either as to the principle on which they act, or even as to their utility. Upon an extensive examination of the subject, the preponderance of evidence seems to be decidedly in favour of their employment. To bring the constitution of young children fully under the influence of mercury is often very difficult, and especially so in this disease; and even when we have succeeded, and the gums and salivary glands have become affected, the case too often runs rapidly on to its fatal termination. A few cases, however, seem unequivocally to have been saved by this remedy; and in many the convulsions and other symptoms have been rendered milder by it, and the senses restored, though the disease has not been eventually arrested, or the patient has been too weak to rally again. The effect of

mercury in controlling inflammation and modifying the action of the exhalents in other parts of the body is notorious; and in certain affections of the eye, as every step in the progress of improvement is exposed to view, there can be no doubt as to the reality of its influence. Its first introduction into the treatment of hydrocephalus was grounded on the hope of increasing the activity of the absorbents, and cases have since been recorded where it seems incontrovertibly to have had this effect. Thus in a young child labouring under the disease, where the sutures were not yet closed, Dr. Clarke has seen the fluctuating tumour at the fontanelles gradually disappear under the use of mercury; and numerous instances of recovery by the same means in very advanced periods of the affection, in some of which effusion had in all probability occurred, are favourable to the same hypothesis; as is likewise the influence which it seems occasionally to exert in cases of chronic hydrocephalus.

Considerable embarrassment is often felt as to the precise period at which the mercurial treatment should be commenced. To lay down any invariable rule as to this or any other part of the management of a disorder which appears under so many different forms, is impossible; but to give this practice a fair trial, it must be commenced before the inflammatory stage is very far advanced; and as we are often not called in till the disease has already existed many days, it is frequently necessary, after merely clearing out the bowels and abstracting a due quantity of blood, to proceed immediately to the use of mercury.

Calomel is the preparation usually employed. It may be given in doses of one or two grains, with or without opium, according to the state of the bowels and other symptoms, and is to be repeated every third or fourth hour till the gums become affected, unless griping and diarrhoea be induced by it, in which case the hydrarg. cum cretâ, or the external use of mercury should be substituted. Gölis, though he has great faith in calomel in the commencement of the inflammatory stage and previously, is averse to the large doses usually given in England, as he thinks he has seen them in some instances produce fatal enteritis, both in this disease and in croup. The dose to which he confines himself is half a grain repeated every two hours, till it produces four or five green slimy stools or colic; and after these effects have ceased, he returns to it again. If the bowels are very hard to move, he combines with it three or four grains of jalap previously toasted, in which state it is less apt to sicken or gripe. Children under one year he finds bear larger doses of calomel without colic, diarrhoea, or salivation, than those several years older. His experience here coincides with that of Dr. Clarke, who never saw salivation induced in children under three years of age save in three instances, though he employed it largely in a variety of diseases.

The corrosive sublimate in minute doses has been preferred by some practitioners when it is necessary to produce the specific effects of

mercury very rapidly. Dr. Merriman, who has succeeded in curing two cases of the disease with this preparation, employs it in doses of from one-thirtieth to one-sixteenth part of a grain repeated every four or six hours, with the effect of producing copious olive-green stools, and an increase in the urinary secretion.

In very urgent cases both the internal and the external employment of mercury should be combined. From half a drachm to a drachm of mercurial ointment may be rubbed into the thighs, or in very young infants more conveniently into the back, three or four times a day; and it may also be used as a dressing to blistered surfaces. If in the case of infants this ointment be objected to, calomel may be rubbed into the gums, three or four grains at a time, and repeated every four or five hours.

In whatever form mercury is employed, it is usually requisite to continue its use for a great number of days uninterruptedly; and when either it or any other medicine has produced a favourable change in the disease, its employment should never be abruptly terminated, but on the contrary very gradually relinquished. The only exception, perhaps, to this rule is in regard to digitalis.

Blisters.—The greatest contrariety of opinions prevails as to the period at which blisters should be used, and the place where they ought to be applied. If employed at all in the commencement of the disease, while the inflammatory symptoms continue high, a practice the propriety of which there is much reason to doubt, it should only be to parts at a distance from the disease, as the legs or arms, or between the shoulders, with a view to producing derivation from the seat of the inflammation. In the acuter cases, where there already exist much restlessness and vascular excitement, they can scarcely fail to be injurious till the activity of the circulation has been reduced by adequate evacuation.

In the second stage of the disease, a remarkable alleviation of the symptoms is frequently produced by the application of large blisters to the head or nape of the neck: a number of these may be applied in rapid succession to the vertex and all round the head; or what is perhaps a still more effectual method, the blistered surface may be kept in a state of supuration for several days consecutively, by dressing it with ointment of savin or of Spanish flies. The dread of strangury has deterred many practitioners from the use of the latter, though perhaps without sufficient reason, as it is possible that the occurrence of such an effect might occasionally even have a beneficial influence on the disease in the head. Tincture of cantharides has been exhibited with the very intention of inducing this species of irritation in the neck of the bladder by Dr. Merriman, in doses of five or ten drops every four hours, and the occurrence of severe strangury has appeared to him to arrest the cerebral symptoms; thus exemplifying the influence of a new and artificially excited disease in controlling the morbid action existing in a distant organ.

When tenderness in the epigastric or hypochondriac regions continues even after leeching the part, a blister may be applied here also with advantage. Gölis thinks that from the sympathy of the head with the stomach, a blister over the latter organ exerts a peculiarly marked influence on the cerebral symptoms; but as blisters often rise but slowly in this situation, he generally applies them in preference to the calves of the leg.

We have thus past in review those remedies which seem most entitled to confidence in attempting the cure of hydrocephalus. Of these, purgatives, bloodletting, and cold applications belong, as we have seen, more peculiarly to the early or most inflammatory period of the disease—mercury and blisters to the more advanced stages. But the stages often run into each other by such insensible steps, or are so completely confounded together, as frequently to render any division of this kind of very little avail in practice. It remains to say a few words of some other modes of more equivocal efficacy, or which are useful only as palliatives.

Digitalis.—This medicine, first used in this disease by Dr. Withering, and very generally employed since, is given in the earlier stages with a view to aid in reducing inflammatory action, and in the later to favor the absorption of the effused fluid. It is in that variety of the disease which succeeds to scarlatina, that it has appeared to be of most use. It is not, however, without difficulty that we can ascertain when it has been carried as far as is consistent with safety; for in consequence of the irregular state of the pulse, the tendency to vomiting, and derangement of the cerebral functions which already exist as a part of the disease, we are deprived of some of the chief signs by which to recognise the influence of the medicine. What we have seen of its use in this disease has not disposed us to value it highly. Dr. Cheyne, however, speaks rather favourably of it, and has given two cases in which it seemed to be of use. He begins with ten drops of the tincture, and to every succeeding dose, which is generally given after an interval of four hours, he adds two or three drops more than was contained in the preceding one; so that in a day or two some part of the system may be affected. He has thus given as many as one hundred and twenty drops a day to a child only four years old. He thinks that the slow irregular pulse from digitalis may be distinguished by its smallness and sharpness from that of hydrocephalus, which is not only unequal, but more soft and full. "The languor from digitalis is attended with vertigo, and sometimes with *momentary* blindness; that from hydrocephalus has more of coma in its character." Gölis, without appearing to place much faith in its efficacy, gives digitalis both in the inflammatory stage and in that of effusion—in the latter chiefly as a palliative to moderate the violence of the convulsions. He employs it sometimes in the form of infusion, and sometimes in that of the powder, in doses of a quarter of a grain, com-

bined with half a grain of calomel, repeated every second hour. He has not found it exert much influence on the urinary secretion in this disease. Some continental practitioners prefer extensive frictions made with the tincture of digitalis (sometimes combined with that of squills) to its internal employment. In whatever form it is used, if the pulse suddenly become very feeble, irregular, and slow, with increase of vomiting, and frequent recurrence of dimness of sight or blindness for a minute or two at a time, its use should be immediately intermitted, and stimulants, wine, soup, &c. substituted.

Antimony.—The late M. Laennec succeeded thrice in curing acute hydrocephalus by means of the tartrate of antimony given after his peculiar method. In two of them the disease supervened in the course of a continued fever. The subject of the third was a young man, who, after having sat up nightly in attendance upon his sick master for nearly four months, was seized with occasional vertigo and other symptoms which excited suspicion of some incipient cerebral affection. Some time after this he suddenly dropped down insensible, and after continuing in this state five days was brought to the hospital, where Laennec found him pale, motionless, and with the pupils greatly dilated. Leeches were applied to the temples, and twelve grains of the tartrate of antimony were given in the course of twenty-four hours. The next day he was able to move, and uttered some incoherent words. Fifteen grains were now ordered, and on the third day he had completely recovered his consciousness and power of motion, and the pupil had nearly regained its natural dimensions. He was still very feeble. As he had had no evacuation, eighteen grains of the tartrate were prescribed, and some nourishment. On the sixth day he was in a state of rapid convalescence; and crying out for food. Subsequent trials of this plan of treatment have not, we believe, tended to confirm the expectations which these cases (which by the way do not appear to have been very well marked examples of the disease) had raised.

The late Dr. Mills was in the habit of giving rather large doses of the tartrate of antimony, with a view to lower the pulse and relieve the headach; combining it, when the stomach was very irritable, with the tincture of opium. James's powder is, however, the preparation which has been most frequently used; small doses being given either alone, or oftener in combination with calomel, or calomel and opium, or with cathartics, with a view both to directly reducing the inflammatory action in the brain, and to assist in restoring the secretions of the abdominal organs and of the skin. This method of giving antimony is favourably spoken of by Dr. Cheyne. It has also been administered empirically in very large doses, so as to induce profuse perspiration, and it is said at times with success: in the hands of regular practitioners, however, this mode of giving it has failed entirely.

Opium.—In the second and third stage of

hydrocephalus considerable benefit has resulted from the use of opium. It has appeared not only to relieve the pain in the head and calm the general irritability, but also to reduce the morbid irritation in the intestines, and thus lead to an improvement in the stools, to render the pulse fuller and less irregular, and the convulsions less frequent; whilst fortunately it seems in no respect to impede, but rather to favour the action of other remedies. From the eighth to the fourth part of a grain of opium, or three or four grains of Dover's powder, may be given every fourth hour, either alone or in combination with calomel and antimony; or else with hydrarg. cum creta if there be great irritability of the mucous membrane. The contraction of the pupil which ensues after the use of opium has been pointed out by Drs. Crampton and Cheyne as affording evidence of the remedy having been carried as far as is safe. Dr. Brooke has recorded a case in the *Transactions of the College of Physicians in Ireland*, where Dover's powder, in large and repeated doses, proved a very useful palliative. All agree that a moderate employment of opium does not interfere with the action of the bowels. When its use is once commenced, the patient must be kept steadily under its influence; as, if suddenly withdrawn, the symptoms recur with increased violence.

Squills, colchicum, and other diuretics, have been recommended in the advanced periods of the disease. When, however, the stomach is very irritable, we must be cautious in the use of medicines which might aggravate the vomiting, and thus increase the determination of blood to the head. Dr. Warren, indeed, was bold enough to use emetics in hydrocephalus, but in this he has had few imitators. The warm bath, which has in this country been occasionally found a useful auxiliary, is thought by Gölis to determine the blood still more strongly to the head, and thus aggravate the violence of the symptoms. M. Itard is an advocate, in the advanced stages of the disease, for the use of the vapour bath impregnated with vinegar, a powerful means of stimulating the surface and producing an abundant flow of perspiration. At an earlier period, when there is much reaction in the system, M. Recamier, on the other hand, has used the cold bath, and it is said with some benefit. Fomentations to the abdomen when pain is complained of there; stimulating pediluvia, or what is more convenient and equally efficacious, sinapisms to the extremities, are also frequently had recourse to. Tartar emetic ointment is recommended by Mills, especially in those cases which have succeeded to a repelled eruption. When applied to the extremities, it has sometimes appeared to produce a very useful derivative action. In a disease in which the unfortunate patient often lingers on for an unexpected length of time in a state of great apparent suffering, a state at all times distressing to friends to witness, and most so when no efforts are made to relieve it, the advantage of a variety of resources during the long and painful

attendance is obvious. Recoveries having occasionally taken place under circumstances which seemed utterly hopeless, the medical man who values his own reputation will not resign himself to absolute inactivity at any period of the disease.

Palliatives. When we fail in subduing the morbid condition of the brain which constitutes the disease, something may still be done in the way of alleviating symptoms, and, even when death seems inevitable, in rendering the steps which lead to it less painful. To enumerate all the measures conducing to these ends would be to repeat much of what has been already detailed. Thus moderate blood-letting, either local or general, according to the degree of strength remaining, will often, even in the advanced stage of the disease, afford considerable relief, without appearing in any degree to accelerate the progress of the disease. Opiates at the same period form an invaluable resource.

Vomiting may sometimes be temporarily stayed by effervescing draughts, to which a few drops of laudanum and ether are occasionally added with advantage. This symptom may also be frequently much relieved by the administration of laxative enemata, to which a nutritive quality may be at the same time imparted.

Convulsions can often be cut short by the affusion of cold water on the head, or even by sprinkling the face and chest plentifully with it; a measure which is at once of easier application, and more frequently successful, than the warm bath. The simultaneous employment of cold to the head and the warm bath is often very efficacious. Musk and zinc in large doses appeared to Odier to have considerable influence in controlling this symptom. When very violent and long-continued, the trial of an enema, composed of a very weak solution of tobacco, might perhaps be justifiable. For the mode of employing it, and its utility in an analogous instance, see GLOTTIS, SPASM OF. Where coma is the predominating feature of the complaint, strong coffee or tea have been given in the advanced period of the disease with some appearance of benefit. Retention of urine is often relieved by turpentine enemata or the hip-bath.

The diet in the earlier and more inflammatory part of the disease should be strictly diluent; but when it has already run on for a number of days, with rapidly increasing debility and emaciation, it becomes a very important object to support the strength. This is peculiarly necessary where the urine, perspiration, or any of the evacuations, has, either by a spontaneous effort of nature or under the influence of medicine, become unnaturally increased. Under these circumstances, beef-tea, jelly, asses' milk, &c. should be freely given. Life has sometimes seemed to be considerably prolonged in this disease under the influence of light stimulants and tonics, wine, small doses of ammonia, quinine, &c. Arnica is a favourite remedy with some German physicians:

we need not say how reluctantly and with how much caution such remedies should be had recourse to.

When recovery takes place, the convalescence is often very slow, and requires uninterrupted attention to the state of the bowels, and great care in the regulation of the diet. Asses' milk is here an invaluable article of nutriment, as it recruits the strength without exciting the pulse, oppressing the stomach, or confining the bowels.

If hydrocephalus supervenes in the course of an infantile fever, or in a child greatly debilitated by diarrhoea or other previous illnesses, the treatment presents peculiar difficulties. We are here often unable to venture on general bloodletting, and are obliged to trust to leeches, cold applications to the head, blisters, and calomel, to which opium is to be added if there be great irritability of the mucous membrane or nervous system. Such remedies certainly afford a fairer prospect of success than the *arnica*, *serpentaria*, and other stimulants recommended by Kuhn and some other German writers.

Where the head becomes suddenly attacked in a patient labouring under one of the exanthemata, nothing but the most vigorous antiphlogistic measures condensed into the shortest possible space of time can afford even a chance of safety. Venesection or arteriotomy, leeches, ice to the head, or a stream of cold water poured from some height on the vertex, purgatives by the mouth, or if the patient is unable to swallow, active enemata; and stimulating vapour-baths where the eruption has suddenly receded, or sinapisms or blisters to the extremities, should all follow each other in quick succession. The following case from Gölis gives some idea of the rapidly fatal nature of the attack. A child of two years old, on the fourth day from the eruption of scarlet fever, seemed to be going on favourably at eight o'clock in the evening. At midnight it became highly feverish and convulsed; spasms of the muscles of the back and palsy of the right side soon followed, and within ten hours it was dead. We have ourselves seen it fatal on the second day of the attack. Fortunately, however, this may be considered a rare form of the disease. That which occurs in the convalescence from scarlatina is much more frequent. It comes on with giddiness, headache, somnolence, and nausea or vomiting, to which convulsions and all the other symptoms of hydrocephalus are soon added. It demands the prompt employment of bloodletting and purgatives, blisters, and digitalis. Bark has appeared to Dr. Blackall to have much effect in accelerating convalescence.

Prevention.—Where there is reason to suspect a predisposition to hydrocephalus, as is the case with respect to the children of a family which has already suffered by the disease, and perhaps with regard to scrofulous children generally, the earliest attention should be paid to every deviation from the natural state of the functions of the body, and especial care directed to the condition of the digestive

organs. To support their tone and that of the whole system by good air, nutritious unirritating diet, and daily exercise, is a point of prime importance. Where costiveness exists, or the stools by their unnatural colour or consistence indicate derangement in the secretions of the liver or mucous membrane of the intestines, appropriate remedies should not be a moment delayed.

An issue or seton in the arm or neck has sometimes seemed to have a remarkable influence in warding off this disease. We know an individual of a family strongly predisposed to it, whose life appeared to have been saved by an issue long kept open in the arm. Though the eighth child of the family, he was the first who survived infancy, the seven older ones in whom this precaution had been neglected having all died of hydrocephalus. Dr. Cheyne, in the work to which we have been so frequently and so largely indebted, mentions some still more remarkable instances of the good effects of establishing an artificial irritation at some distance from the morbidly disposed organ.

The parents and instructors of children of a peculiarly precocious intellect should be made aware of the danger of early and protracted application. In such individuals it should be our object, if possible, rather to retard than to accelerate the development of the brain and of the mental faculties connected with it; and it is only by postponing the interests of their intellectual to those of their physical education, till the constitution has become established and the period of danger is past, that this object can be attained.

II. CHRONIC HYDROCEPHALUS.—This affection may be either congenital or acquired. When congenital, some malformation or defective development of the brain in many cases coexists. When acquired, it may either come on as the sequel to the acute form, which however is rare; or it may originate insensibly, and attract little attention till the functions of the nervous system and of the body generally become perceptibly deranged by the pressure of the effused fluid. In all its forms it is in the earlier stages of existence, while the brain is undergoing the process of evolution, that it chiefly occurs.

When the cranium becomes very much enlarged, as the face retains its ordinary dimensions, or is even smaller than natural, the visage assumes a singular triangular appearance, and the patient being unable to support the immense head, it hangs on one shoulder or on the breast. The sutures and fontanelles continue widely open, and pulsation of the arteries, as well as the fluctuation of the contained fluid, can be distinctly felt through them. Occasionally, from the unequal yielding of the brain and its membranes, a circumscribed tumour presents itself at some of these openings.

That the dimensions of the head are always increased is the popular belief; and Frank has included enlargement of this part in his definition of the disease. Yet this is far from

universally taking place, for the head is sometimes of the ordinary size, or occasionally even smaller than natural.

Gölis, the best writer on this disease with whom we are acquainted, and Breschet, who usually copies him closely, have divided the disease into three varieties, having relation to the size of the head. The first variety, or that in which the head is enlarged, is either congenital or commences in early childhood. The second, or that in which it is unnaturally small, is always congenital. The sutures are found closed at birth, and the head is of a conical shape. Such children are usually dead-born, or die in convulsions soon after they come into the world. Should they by chance survive a few months, their intellect is totally defective; they are blind, with the pupils greatly dilated, and the eyeballs in constant convulsive motion. They lie in a state of almost total insensibility, with their legs crossed and drawn up to the belly, their toes contracted and feet distorted. Of this variety Gölis has known but a single instance attain the age of eighteen months. The third variety, or that where the head is of the natural size, is perhaps the commonest of all, as it may take place at any period of life.

In chronic hydrocephalus the intellectual faculties, the senses, and the muscular power all suffer. The patients labouring under it become emaciated, and of a pallid unhealthy complexion, stupid and indifferent to external objects. The countenance is without expression. The senses become successively impaired, the sight being the first to fail. The gait is unsteady, as the power over the involuntary muscles is in a great degree lost.

The following abstract of the symptoms is chiefly taken from the second volume of Gölis's work, which has not, we believe, hitherto been translated into English.

When the disease comes on at a period subsequent to early infancy, its first approaches are commonly indicated by an unusual excitability of the nervous system. The individual is easily made to laugh or to cry by the slightest causes, is peculiarly irascible, and the temper and dispositions are totally changed. The memory is impaired or lost. The muscular debility is excessive. Epileptic fits, especially at night, are of common occurrence; and on awaking a peculiar piercing cry is often uttered. There is a great degree of sleepiness, together with a dull pain and heaviness of the head. By shaking the head, vertigo or complete stupefaction is brought on. If we make pressure on the fontanelles, a soporose state often accompanied with convulsions is induced. The pupil of the eye becomes larger and larger as the disease advances, and amaurosis usually takes place in the end. Squinting exists in some instances, whilst in others the eyeball oscillates from side to side. The sense of smell becomes perverted or lost. In the former case imaginary odours are complained of; and the nose is at all times itchy and dry. The function of hearing is also impaired. In short, the senses of taste and touch are often the only ones retained, and these occasionally in a very

imperfect degree. Violent grinding of the teeth, which are thus sometimes worn down to the stumps, is very common. If the patient possess the power of speech, it is for the most part nasal and snuffling, and often interrupted for want of words in consequence of the defective state of the memory. From the mouth, which is usually half open, the saliva is constantly dribbling, either from this secretion taking place in an excessive quantity, or from a diminished power of swallowing. Of the secretions and excretions the saliva and tears are the only ones which do not appear to suffer a decrease.

The functions of the digestive organs are considerably changed from the natural state. The appetite is often voracious; there is frequently a tendency to vomit, and obstinate constipation is rarely absent. The urine is diminished in quantity, and both it and the fæces in the advanced stages of the disease are passed involuntarily.

As the disorder advances, the pulse and respiration become affected, the patient sighs much, and is put completely out of breath by the slightest causes, and paroxysms of suffocative cough occasionally take place. Debility and loss of power over the voluntary muscles is one of the earliest symptoms, and is manifested in the unsteadiness of the gait. Automatic motions of the limbs are common. The posture is much influenced by the disease. When it has made some progress, the erect position of the body can often no longer be borne, as it causes pain in the head, with lightness and stupefaction, and inclination to vomit. There is usually a disposition to keep the head lower than the rest of the body, and not unfrequently a preference is manifested for lying on the belly with the face buried in the pillow. When they lie on the back, the head is often rolled with great regularity from side to side. In the last stage the patient lies gathered up, with the legs crossed and drawn up against the belly, the cervical vertebræ and head being thrown back, whilst the rest of the spine is bent forward. As the disease approaches its fatal termination, the pulse becomes weak, irregular, and intermitting, and the extremities cold and damp. Death takes place either by the superposition of the symptoms of acute hydrocephalus, or by a slow hectic fever, the scene finally closing either with a paroxysm of suffocative cough or with an attack like apoplexy.

Though the impairment of the intellect and senses usually keeps pace with the advancement of the disease, and the subjects of it at length may be said rather to vegetate than to possess an animal existence; yet a few cases are on record, where, though the head had attained to a very considerable magnitude, the individual continued perfectly rational and observant of things around him; whilst in other instances again, amidst the general wreck, some one faculty, as the memory for example, has alone escaped uninjured. The moral qualities usually suffer as much as the intellectual, the hydrocephalic patient being fre-

quently passionate and revengeful; and every time that a fit of anger is excited, convulsions are apt to follow.

The sexual propensities commonly continue strong, and in several instances, in children of both sexes, a remarkably premature development of the organs of generation has been observed.

Hydrocephalus being a disease of fetal life, and the unnatural-sized head often presenting a great obstacle to delivery, and frequently even requiring an operation destructive of the life of the child, its early detection would be very desirable. Unfortunately, however, till the head actually presents itself in the progress of delivery, we have no means of detecting its existence. The fact of the mother having previously borne hydrocephalic children should excite a suspicion of its existence in cases of difficult parturition.

The disease may take its rise either before birth or very soon after it, or more rarely during the later periods of childhood. Yet even adult age is not altogether exempt from it. Gölis has mentioned three cases where it came on in old age. Two of the individuals in question were above seventy years old. The third, who was a physician in Vienna, likewise died of it at a very advanced period of life, after having suffered from the disease ten years. In such cases, however, it rarely runs on for more than three years. In cases occurring subsequent to early childhood, no change in the external form of the head is appreciable, for the sutures and fontanelles in most children are found already closed in their second or third year. Occasionally, however, as we learn from Ruysch and Van Swieten, they remain open much longer. We know at present of a child of upwards of six years old, in which the posterior fontanelle is still open; it is of a scrofulous habit, but has hitherto manifested no tendency to hydrocephalus. Dr. Baillie met with a singular case in a boy of seven years of age, where the coronal and sagittal sutures, after having been firmly closed, reopened to the extent of half an inch and upwards from the pressure of the accumulating fluid. The same author has detailed an instance of chronic hydrocephalus occurring in a man fifty-six years of age, in the ventricles of whose brain six ounces of fluid were discovered. The chief symptoms were pain of the head, and a loss of memory so great that he could recollect but five words, which were continually reiterated to express all his wants. He seemed to retain somewhat of his intelligence. There was no dilatation of the pupils, and the sight was good. The pulse was occasionally rather quick, and never became either slow or irregular. The hemiplegia which existed was accompanied with a permanent rigid flexion of the paralytic limbs, like a fakir. Heberden, on the other hand, has mentioned the case of a man in the ventricles of whose brain, though eight ounces of water were found on dissection, no symptom of hydrocephalus had existed during life.

The duration of this disease is very various.

When it commences in utero, death almost always occurs very soon after birth; and if it originate in early infancy, the child very rarely survives the third year. Yet the brain in some instances becomes, as it were, reconciled to the pressure of the contained fluid, and existence has thence in a few rare cases been prolonged to adult age. Gölis mentions one in which the patient lived to twenty-seven; Aurivill another which reached forty-five years; and Gall one which attained to fifty-four years of age. In the case of Cardinal, who died in Guy's Hospital a few years ago at the age of thirty-two years, the head was of a great magnitude, being thirty-three inches and a half in circumference, and twenty inches and a half from ear to ear. Notwithstanding this immense enlargement, many of the functions of the body were little impaired. The appetite and digestion were natural, and his intellect not remarkably deficient. He was, however, subject to occasional epileptic attacks, especially when costive; and he was unable to walk much, as vertigo was speedily induced by it. For some weeks before his death he was somewhat comatose, though still capable of answering questions when roused: the insensibility gradually increased, and he sunk at length as if apoplectic.

Prognosis.—It is only in the early stage that much can be effected by medicine in this disease. If treatment be deferred till the head has become greatly enlarged, the case is too often hopeless. When it is congenital, or occurs very soon after birth, its termination is, according to the best authorities, invariably fatal. In other cases, Portenschlag, Dreyssig, Richter, and Gölis, think it may often be cured, especially if there be no complication, if the disease be early seen, and no great exhaustion has as yet come on. Frank looks upon the disease as very generally incurable. He knew of one case which disappeared on the invasion of a scrofulous affection in another part of the body; and both he and Gölis have seen the breaking out of chronic cutaneous eruptions and sores behind the ears have a very favourable influence over the disease. On the other hand, where any of the exanthemata supervene, speedy death is the usual consequence. Cases originating where there is a scrofulous or syphilitic taint, or after concussion or other accidents by which the texture of the brain may have been injured, have appeared to Gölis particularly unfavourable. Those which arise as a sequel to acute hydrocephalus are likewise very unpromising, as has been already stated. The same may be said of those cases where there is long-continued coma, furious delirium, or frequent convulsions from very slight causes.

Of the *causes* of this disease little is known with certainty. A strong predisposition to it undoubtedly exists in certain families. Thus Frank mentions the circumstance of a mother bearing seven children, all of which were born with this affection; and Gölis another, in which six of the children were born prematurely in the sixth month of pregnancy, labouring under chronic hydrocephalus; and in the three others,

which were carried to the full time, it appeared soon after birth. The father being very old or drunken, is thought by the last-named writer to predispose the offspring to the disease; and perhaps intemperance in either of the parents has a similar tendency. A scrofulous habit, and violence done to the head in birth, may also be numbered amongst the predisposing causes. Mechanical injuries, falls, shocks, and blows, are capable of exciting it; as is likewise the sudden repulsion of cutaneous diseases, the suppression of the menses, over-exertion of mind, and long-continued anxiety.

Appearances on dissection.—The bones, which are usually remarkably thin and transparent, are frequently separated from each other by a very considerable interval. When the patient has lived for several years after the commencement of the attack, nature often appears to make an effort to close the sutures by the establishment of new points of ossification and the formation of *ossa wormiana*. The thinness of the bones of the skull, though an ordinary, is not an universal appearance. They have sometimes, on the contrary, been observed of unnatural thickness, which, like the supernumerary bones above alluded to, seems to mark an attempt on the part of nature to counteract the effects of disease, and restore to the cranium a proportional thickness. It is supposed that such thick and large skulls on being dug up have been mistaken for those of giants, an error which attention to the comparatively diminutive bones of the face would have prevented. The head of hydrocephalic patients is sometimes of a very irregular form, one side being much more prominent than the other. The effused fluid is found either in the ventricles, or, though much more rarely, in the great sac of the arachnoid. In the former case the ventricles are extremely dilated, the convolutions are unfolded, and the brain converted into a thin membranous-like sac, in which the medullary and cineritious substance can no longer be distinguished. The corpus callosum is much raised, and the septum lucidum occasionally torn or destroyed, so that the brain has sometimes been found forming only one great hemisphere without any central division. The cerebral substance seems denser than usual, and its absolute quantity as compared by weight with that of a healthy individual of the same time of life, in many cases does not present any diminution.

When the water is contained in the sac of the arachnoid, frequently scarcely any appearance of brain can be discovered; or the parts constituting its base, the pons varolii, medulla oblongata, &c. alone exist.

With water in the head and imperfect development of the brain, malformation in other parts of the body frequently coexists. It is now a generally received doctrine that many congenital defects of structure depend upon the continuance of certain states belonging to the earlier periods of fetal existence beyond their proper time. Thus the fluid which naturally occupies the ventricles during the first steps of the formation of the fetal brain, by remaining

unabsorbed, may lay the foundation of congenital hydrocephalus.

A rare species of the disease is mentioned by Schmalz, in which the fluid is encysted. In such cases the sudden bursting of the sac has led to a fatal result. Gölis met with a cyst of this kind about the size of a goose's egg, situated between the hemispheres, in a child of six years old, who died suddenly, though the bag was in this instance entire.

The quantity of fluid discovered in the head varies from a few ounces to several pounds. Cases in which upwards of ten quarts have been found are on record. In the case some years ago in Guy's Hospital, to which we have already alluded, the bones of the cranium were found on dissection to be of an ordinary thickness. On cutting through the dura mater water immediately gushed out. This was of a pale yellow colour, and the total quantity contained within the head was found to exceed ten pints. At the bottom of the great cavity formed by the immensely dilated skull, lay the brain much flattened. The corpus callosum was defective, so that the ventricles of the brain communicated directly with the great sac of the arachnoid. This was, by some of those present, thought to be a natural malformation, as the convolutions of the brain were not unfolded and obliterated, as in those cases where the effusion takes place originally into the ventricles.

Dr. Baron, in the eighth volume of the *Medico-Chirurgical Transactions*, has given the history of a very interesting case of congenital hydrocephalus. At three months old the head had attained to the enormous magnitude of twenty-nine inches in circumference. About this time a swelling appeared at the posterior fontanelle, and soon acquired the magnitude of a goose's egg. This suddenly became much smaller and soft, and a constant dribbling from the urinary passage was observed, by which the head in three days became so reduced in size, and the integuments were so relaxed, that the skin of the forehead fell in wrinkles over the eyes. The urinary discharge by the end of two months diminishing, the swelling on the top of the head reappeared. A watery discharge tinged with blood now began to ooze from the nostrils and mouth, and flowed most freely when the head was held forward; by this the tumour was again reduced, and the circumference of the head brought down to twenty inches. The child died at eighteen months old. On dissection, the dura mater was found ruptured, a well defined circular opening nearly an inch in diameter existing in the situation of the tumor, and communicating directly with the interior of the brain. The brain itself, which was expanded into a great sac with very thin parietes, had likewise given way at this part, and thus allowed the fluid from the internal cavity to escape into the outward swelling. A probe passed easily through the æthmoid bone into the nose.

Treatment.—In this disease the unassisted efforts of nature seem incapable of effecting any thing. The indications consist in the re-

moval of the fluid already contained within the cranium, and in subduing the tendency to its further effusion; but unfortunately the resources which we possess will too often prove utterly unavailing towards the fulfilment of either of these objects. Diuretics, purgatives, and diaphoretics, together with mercury, tonics, and a strengthening diet, are the internal measures which, singly or conjointly, have been most confided in; whilst, externally, it has been recommended to keep the head warm, to apply aromatic and slightly stimulating embrocations, or to employ severer but more promising remedies, such as blisters, issues, tartar emetic ointment, and even the actual cautery. Local and general bloodletting have also frequently been had recourse to.

Gölis asserts that he has cured the majority of cases when early seen, provided they were not congenital or occurring very soon after birth, by the long-continued use of calomel internally, by the application of a mercurial ointment to the head, which is kept constantly covered with a woollen cap, and by the daily use of stimulating baths.

In more obstinate cases he has been obliged, in addition to these measures, to employ issues, blisters, or tartar emetic ointment to the head, and under particular circumstances leeches or cupping. In scrofulous habits a tonic plan of treatment must be carried on simultaneously with the above remedies. He has occasionally, also, called in the aid of mild diuretics or diaphoretics, and such measures as appeared to him best calculated to quiet nervous irritation, and to support the strength.

The remedy which has most frequently appeared useful is, unquestionably, calomel. This he gives in doses of half a grain twice a day; and if it purge too much, he reduces it to a quarter of a grain, or even intermits its use for a short time. Whilst employing calomel, one or two scruples of mercurial ointment, combined with an ointment of juniper berries, are rubbed into the head every night. The woollen cap, in which he has great confidence on account of its keeping up a constant though slight counter-irritation on the closely shaven scalp, and at the same time supporting the insensible perspiration, and preventing the sudden cooling of the head, is worn constantly for many months, and even then only very gradually laid aside. Becoming impregnated with mercurial ointment, it must help to bring the constitution more speedily under the influence of this remedy.

Mildly stimulating baths he conceives likewise to have a very beneficial influence, as they tend to excite an extensively diffused though moderate stimulus over the whole cutaneous surface. Alkaline baths may be employed for this purpose. Baths holding tartar emetic in solution, in the proportion of one ounce of this substance to a pailful of water, and gradually made three or four times stronger, have been found by M. Recamier a very useful remedy in this disease, appearing, whilst it reduced the size of the head, to

act as a diuretic, and render the patient thinner.

If in five or six weeks some improvement is observed, or if salivation takes place, the calomel and the ointment are to be used only every second or third day. During the whole continuance of the mercurial course an ascendent vegetable diet is to be avoided, as being liable, according to Gölis's experience, to cause colic and gastro-enteritis. Infants require no other nutriment besides good breast-milk, whilst for older patients a moderate quantity of flesh meat is proper. In mild weather they should both be much in the open air. Under this plan of treatment Gölis has known the circumference of the head decrease by from half an inch to an inch in a period of from six weeks to three months, and has frequently seen a perseverance in it effect a perfect recovery both of the mental and bodily powers. When the automatic motions of the limbs cease, and the patient becomes able to hold up the head, to sit up, and even to walk a little, we have evidence that a beneficial change is going forward.

If within two months, on the contrary, no improvement is visible, mild diuretics, such as the acetate of potass or squills, may be associated with the preceding remedies, together with an issue in the nape of the neck, or in both arms, kept open for many months; or tartar emetic ointment, or blisters to the same parts, so as to keep up a steady discharge. The use of these measures is particularly indicated when the disease has supervened on the sudden disappearance of a cutaneous eruption. We have known large blisters, applied alternately to each side of the head for many weeks in succession, productive of much benefit. Convalescence, according to Gölis, may be much accelerated by minute doses of the sulphate of quinine, as a quarter of a grain thrice a day.

If acute inflammation of the brain or its membranes supervenes, the antiphlogistic plan of treatment must be put in practice; leeches, calomel in larger doses, blisters to the calves of the legs, &c. Even in the later period of the disease, when hectic fever has come on, the symptoms have been moderated and life prolonged by leeches and calomel.

The palliative treatment recommended by Gölis in the advanced and hopeless stages, consists in such medicines as tend to promote the secretions, and to moderate convulsions, viz. aperients, diuretics, and antispasmodics.

As to the propriety of evacuating the water by means of an operation, where all other means have failed, practitioners have long been divided in opinion. Gölis has given the names of twenty-seven writers who have expressed themselves in favour of it, especially if the fluid be slowly evacuated, and at several repetitions of the operation. Yet he himself along with seven or eight others, including Boerhaave, Heister, Hecker, and Portenschlag, proscribe it altogether as cruel and useless. Richter thinks, that even where the water is gradually

drawn off, death by the disease always sooner or later ensues; and Gölis asserts that the fatal termination is even accelerated by it. It appears to us, however, that he has spoken too decidedly on this point, as there are a few cases on record where it has appeared to effect a cure, and several where it has palliated the symptoms. In cautious hands, and where only a moderate quantity of water is drawn off at a time, it has rarely been attended with any immediate danger. In cases where all other kinds of treatment have been tried without benefit, this is, perhaps, not altogether to be rejected.

In a case related by Dr. Vose of Liverpool, in the *Medico-Chirurgical Transactions*, this operation was performed with complete success on an infant seven months old, when the head was more than double the natural size. The instrument used the first time was a couching needle, and the quantity of fluid drawn off upwards of three ounces; about as much more was supposed to have dribbled away afterwards, upon which the child became very weak, but revived by means of the moderate administration of slight cordials. About six weeks after, the water having re-accumulated, an opening was made with a bistoury, and eight ounces were again taken away; and by a third operation nine days after the second, twelve ounces were drawn off without any injurious effect on the general health. A copious serous diarrhoea now set in, by which considerable debility was induced, but this was only temporary. The head gradually diminished in size, and the patient completely recovered.

Mr. Lizars has detailed a case in the *Edinburgh Medical and Surgical Journal*, in which he operated about twenty times in the course of three months. The instrument which he usually employed was a delicate trocar, which was introduced at the most laferal part of the anterior fontanelle, so as to avoid the longitudinal sinus, and thrust in to the depth of about one inch below the surface of the integuments. On the reduction of the water the strabismus and dilatation of the pupil ceased immediately. In some of the later operations, the sutures having become in part closed from the progress of ossification, the head was no longer capable of being adequately compressed, and air rushed in to supply the place of the extravasated fluid, but without any ill effects ensuing. The case proves, if not the utility of the operation, at least its safety, when carefully conducted. About the same time with the above case, another was published in the same journal by Dr. Freckleton of Liverpool, in which the lateral ventricles were four times punctured with safety; but in the fifth operation, fourteen ounces of fluid being taken away at once, the child became very uneasy and convulsed, and died on the ninth day.

More recently the operation has been repeatedly performed, and with very favourable results, by Dr. Conquest of London, to whose kindness we are indebted for the following particulars. The total number of children on

whom he has operated is nine, and in four of these the operation has been completely successful, the individuals being now quite healthy and free from every symptom of their former complaint. The largest quantity of fluid withdrawn at any one time has been twenty ounces and a half; and the greatest number of operations on one child has been five, performed at intervals varying from two to six weeks. The largest total quantity of water removed was fifty-seven ounces by five successive operations. The trocar was introduced through the coronal suture, below the anterior fontanelle; and pressure on the head was subsequently made by strips of adhesive plaster, with which likewise the wound in the integuments was carefully closed after each operation.

The first successful case was operated on before a large number of medical men at St. Bartholomew's Hospital in the session of 1829. Of this, and a subsequent one, a short account appeared in the *Lancet* in April and November, 1830, to which we refer the reader for further information.

Puncture has likewise been lately had recourse to with complete success by the celebrated Graefe* of Berlin, in the case of an infant whose head, of preternatural dimensions from birth, had attained to a great magnitude at the age of four months, when the first operation was performed: no derangement in the functions of the body had, however, as yet manifested itself. The operation was repeated eleven times within the course of six months. The fluid was each time allowed to escape only slowly and interruptedly; and the canula was altogether withdrawn and the wound closed as soon as the pulse was observed to become weak, the pupil contracted, and the expression of the face altered, symptoms which, under the influence of stimulants, always disappeared within a few hours after the operation. Each operation was followed by a considerable diminution in the size of the head, and after the eleventh and last the sutures closed. The child could walk and speak before it was a year old. At the age of two and a half (upwards of a year and a half after the completion of the cure,) it was exhibited at the Medical Society of Berlin.

A still more recent instance of the value of this operation has been put on record by Mr. Russel of Edinburgh.† At three months old the head of his patient had attained to an enormous size, (twenty-three inches in circumference, and fifteen inches and a half from ear to ear.) There was strabismus and constant rolling of the eyes, irregularity of the bowels, and frequent starting in sleep; but the pupils were neither dilated nor insensible. Compression, blisters, mercury, diuretics, &c. having already been tried without the slightest benefit, recourse was had to puncture as the last resource. By four operations performed at

* *Graefe and Walther's Journal für Chirurgie*, &c. 1831, b. xv. p. 3.

† *Edinburgh Med. and Surg. Journ.*, July, 1832.

intervals of about ten days, the dimensions of the head were considerably reduced. After the fourth operation, the water again threatening to accumulate, calomel was administered in small doses, so as to affect the mouth, by which all the remaining hydrocephalic symptoms were removed, and the cure confirmed. The size of the head at eight months old was found to be less by four inches in circumference and two and a half across the vertex, than it had been previous to the first operation; and the ossification of the sutures was complete.

Storch has mentioned an instance of hydrocephalus where the spontaneous escape of about a pint of serous fluid by the nose was followed by temporary relief; and a singular case has been related by Mr. Greatwood, where a child of fifteen months old was accidentally cured of the disease by falling upon the back of the head upon a nail, above three pints of fluid gradually escaping from the puncture thus made.

When the operation of puncturing the head is followed by extreme faintness and collapse, as is occasionally the case when too much fluid is removed at once, small doses of ammonia, or a few tea-spoonsful of brandy and water, may be given to revive the patient. Inflammatory reaction sometimes sets in within the course of a day or two. Here leeches, cold applications, aperients, and other antiphlogistic measures must be employed.

Sir Gilbert Blane, conceiving that chronic hydrocephalus might sometimes depend on a want of firmness and due resistance in the bony compages of the skull, tried the effect of compression by means of a roller, with apparent benefit, in a case related in the Medical and Physical Journal for October 1821. But as leeches and purgatives were simultaneously employed, it is very difficult to say what share the compression had in the amendment which took place. Mr. Barnard has related two cases in the Medical Repository, in which pressure on the head made by means of straps and adhesive plaster, along with leeches and the application of cloths wet with cold water constantly to the head, appeared beneficial. In other hands, however, compression has failed altogether.

(W. B. Joy.)

HYDROPERICARDIUM.—From ὑδωρ, *aqua*, and τὸ περικαρδιον, (*th. περί et καρδία*.) *pericardium*. *Hydrops pericardii*, *dropsy of the pericardium*.—This affection can very rarely require the exclusive attention of the physician, since, although the pericardium is frequently the seat of effusion, it is seldom, probably never, so affected independently of organic disease either of the heart or some other structure. The symptoms consequently are always more or less obscured by the concomitant affections; and even when we are enabled to attain a tolerable certainty of the presence of fluid within the pericardium, its removal alone would have but little effect in restoring the patient to health. These and some other considerations of a similar nature

might almost induce us to exclude hydropericardium from a separate consideration, but as it has usually obtained from nosologists and writers on the diseases of the heart a distinct place, it could scarcely be omitted in a cyclopædia of medicine. The treatment of the subject is, however, a matter of very considerable difficulty, and the information we have to offer must be rather of a negative than a positive kind.

As the pericardium is a serous membrane, and hence always in some degree bedewed with moisture, a preliminary enquiry becomes necessary as to what must be considered its natural state, and what quantity of fluid ought to be regarded as constituting disease. This question has been much discussed by older authors, while the more modern have been usually content to refer to the opinion of Corvisart, without inquiring into the data upon which that opinion was founded.

Among the ancient authors, Vesalius and Lower maintained that the pericardium generally contained some fluid, and the former had observed it in the pericardium of criminals, who had been quartered while yet alive. He was not, however, certain of its existence in every case. Lower says decisively that some fluid is always present, but without any detail of the researches which led him to entertain so positive an opinion. Hoffmann, after referring to these and other authorities, merely observes that he had never been able to detect any fluid in the pericardium of animals which he had opened alive. Haller, after reviewing these and many other writers, intimates that in his opinion some fluid, but in very small quantity, is always to be found, and that it does not usually exceed a few drachms. Littré had decapitated puppies, and had always found some water in the pericardium. Senac, reviewing these contradictions, and remarking that in a number of bodies in which the heart and its envelopes were perfectly natural, the membrane was dry, inclines to the opinion that in the healthy state the pericardium contains no fluid, but at the same time admits that some fluid is occasionally observed which could not properly be referred to disease. Corvisart does not enter at any great length into the dispute, but contents himself with pronouncing, that whenever the fluid exceeds six or eight ounces in quantity, it must be regarded as the effect of disease, and consequently as forming hydropericardium. To this last author Kreysig, Bertin, Testa, and other contemporary writers are satisfied to refer, and in this state the subject still rests. Under these circumstances we have endeavoured in some degree to promote our knowledge of this subject by the result of dissections, and the following tables will shew what proportion of one hundred and fifty examinations exhibited fluid in the pericardium. Fifty of these cases are drawn from our case-book; fifty, respectively, are furnished by Mr. Wickenden and Mr. Parsons of Birmingham, who are well qualified for such investigation. Any appreciable quantity of fluid was always noted, that is, whenever it exceeded a couple of drachms; in some cases even less than this

was noted. To this we shall add an additional table of sixty-four cases, for which we are indebted to Mr. Baynham, whose pathological researches have been very extensive, and are most valuable from the accuracy with which they have been conducted.

I. *Table of one hundred dissections, with the number of cases in which water was found in the pericardium.*

Nature of the disease.	Total number of cases.	Number in which there was water in the pericardium.
Laryngitis.....	2	
Bronchitis.....	12	3
Typhus and synochus.....	7	
Phthisis pulmonalis.....	31	9
Scarlatina.....	1	
Convulsions.....	2	
Pneumonia.....	5	
Hydrocephalus.....	5	1
Peritonitis.....	4	
Enteritis.....	2	
Ascites.....	4	1
Marasmus.....	4	
Diarrhoea.....	1	1
Epilepsy.....	3	
Whooping-cough.....	2	1
Disease of stomach.....	5	1
Internal abscess.....	1	
Arachnitis.....	4	
Disease of kidney.....	3	
Cholera.....	1	
Concussion of the brain.....	1	
Disease of spleen.....	1	
Disease of heart.....	12	4
Fracture of skull.....	1	
Phlebitis.....	1	1
Rheumatism.....	2	2
Apoplexy.....	4	
Hydrothorax.....	2	2
Tumour in the brain.....	1	
Diabetes.....	1	
Sudden death without obvious cause.....	4	
Disease of spine.....	1	
Ovarian dropsy.....	1	
Rupture of uterus.....	1	
Cancer.....	3	
Puerperal convulsions.....	1	
Puerperal mania.....	1	1
Menorrhagia.....	2	1
Pericarditis.....	2	
Ulceration of bowels.....	1	1
Measles.....	1	1
Pleurisy.....	2	
Disease of pharynx.....	1	
Swallowing boiling water.....	2	
Pulmonary apoplexy.....	2	
Total.....	150	30

The largest quantity of fluid was in the case of phlebitis, in which it amounted to sixteen ounces. In the cases of phthisis it never ex-

ceeded eight ounces, and generally not more than four: in some one ounce was the whole quantity. In the other cases it varied from eight ounces to two drachms.

II. *Table of sixty cases in which water was found in the pericardium after death.*

Disease.	No. of cases.
Phthisis pulmonalis.....	14
Diseased heart.....	8
Pleurisy.....	4
Pericarditis.....	4
Anasarca.....	4
Overlaid.....	3
Hydrothorax.....	2
Bronchitis.....	2
Pneumonia.....	2
Diarrhoea.....	1
Diseased kidney.....	1
Apoplexia serosa.....	1
Scrofula.....	1
Fungus hæmatodes.....	1
Typhus.....	1
Atrophia.....	1
Senility.....	1
Hydrocephalus.....	1
Rheumatism.....	1
Asthma.....	1
Spinal disease.....	1
Peritonitis.....	1
Ascites.....	2
Apoplexy.....	1
Disease of stomach.....	1
Blue disease.....	1
Hernia.....	1
Sudden death.....	1

In both these tables it will be seen that tubercular consumption affords the largest proportion of cases in which water is found in the pericardium. Diseases of the heart stand in the next place, and, generally, affections of the chest are much more frequently accompanied with hydropericardium than those of any other cavity. The largest quantity was three pints, and was the consequence of inflammation of the membrane.

The colour of the effused fluid much varied; in most instances being nearly a clear serum, in others being of a chocolate colour. This is in unison with the experience of Kreysig.

Notwithstanding the number of these dissections, they have afforded very little information as to the diagnosis of hydropericardium; nor, if we look at the tables, can we be much surprised at this result. In no single instance did the presence of fluid constitute the only disease when it exceeded a few ounces, and in those cases in which a few drachms only were found, no symptoms existed during life by which attention was attracted to the condition of the pericardium.

Having made these preliminary remarks, we may proceed to state that no very well authenticated case of idiopathic hydropericardium has yet been related. The only instance with which we are acquainted, that is on record, is one mentioned by Morgagni upon the authority of Valsalva; and even of this some doubt may be entertained. The symptoms were

dyspnoea increasing to orthopnoea, cough, mucous expectoration, and fever; and the case proved fatal. The pericardium was distended with water. But as the affections of the mucous membranes were scarcely distinguished in the time of Valsalva, and as many of the symptoms above enumerated were, if not peculiar to, at least such as are usually attendant upon bronchitis, we may be pardoned if we refer the presence of water in the pericardium to the existence of bronchitis. Nor is another case, related by Morgagni, and referred to by Kreysig, Testa, and others, much more illustrative of idiopathic hydropericardium independent of other disease. This case occurred in a nun in whom the over activity of her physician had produced hypercatarsis, and a series of anomalous symptoms for full a year, soon after which she died. The case, nevertheless, is worthy of notice in connection with this subject, although we can scarcely refer to it as a means of diagnosis.

The patient the day after the purging above alluded to became suddenly very faint upon attempting to rise from her bed, and this faintness recurred whenever she attempted to speak or move much. These symptoms continued with little variation for a considerable time; her countenance still remained healthy, and her sleep undisturbed. The bowels acted regularly, and the catamenia were as usual. Respiration in every position was uneasy. Her pulse was regular. There was no palpitation, and no pain in the chest, nor cough. The only complaint was a sense of weight in the region of the heart, and excessive nervousness. Towards the termination of her life she had sharp pains in the region of the heart; her strength gradually diminished, and at length she died. On dissection the only morbid appearances were the effusion of about nine ounces of water in the pericardium, and ulceration of this membrane. The ulceration Morgagni refers to the acrid nature of the water: modern pathologists would, probably, rather refer the whole appearances to inflammation originally, which had produced equally ulceration and effusion, both common terminations of inflammatory action.

These are the only cases with which we are acquainted, where even a pretence can exist for considering hydropericardium as idiopathic: nor does any author of late years ever regard it in this light. Nevertheless, while the science of medicine remains in its present imperfect state, every effort to forward our knowledge of the diagnosis of disease is worthy of encouragement; for if disease is to be treated successfully, excepting by accident, it must be by an accurate acquaintance with all its phenomena.

Like every other form of dropsy, hydropericardium may be the consequence of some affection of the membrane in which it is seated, or of some organic disease of other parts. In the former case it seems always to result from inflammation of the pericardium; in the latter it may be connected with inflammation, or the

simple sequence of the pericardium participating in the atonic state of the general system. Kreysig has attempted to lay down the signs by which we may distinguish effusion in the pericardium succeeding inflammation of the membrane.

According to this author, when the more prominent symptoms of pericarditis subside, a feverish state with slight exacerbations still remains, and for some time a more marked symptom is present. These exacerbations gradually increase both in severity and frequency, and are soon accompanied by anxiety and great sense of oppression. The patient is unable to lie down, and usually sits with the head and chest leaning forwards. The pulse becomes habitually irregular, the appetite uncertain, and the sleep bad. During the exacerbations all these symptoms are worse; the anxiety and restlessness become excessive, and delirium or most painful irritability, one or both ensue. This state continues for some hours, and then nearly disappears, again, however, to return after a short interval of rest. The disease lasts from seven to fourteen, or even twenty-one days. During the last few days of life the patient is less complaining, and endures positions which had previously been intolerable. A species of drunken sleep is manifested; the patient lies as it were in a dream; the action of the heart becomes weak and more irregular; the extremities are cold; the surface of the body is covered with a clammy perspiration; and death at length ensues, as the consequence of a weakened and obstructed circulation.

Such is the account given by Kreysig of this affection; but in it we see nothing to distinguish hydropericardium from hydrothorax. Many of the symptoms are common to this with other diseases of the heart and thoracic organs; none of them are so peculiar-as to mark without error the occurrence of effusion in the pericardium. Still the whole relation is excellent; and could we see the symptoms as well developed in every case, it would certainly much facilitate our diagnosis in this difficult disease. Unfortunately, however, this is seldom the case; sometimes one, sometimes another symptom is absent, and sometimes the dropsy of the pericardium is complicated with other diseases, which leave us doubtful to which affection particular symptoms are to be referred. It is at present scarcely possible to afford any certain signs by which an accurate diagnosis may be obtained.

We might here also notice the affection which Testa has named hydropericarditis of child-bed; it is, however, as in truth is the disease above described by Kreysig, a true pericarditis terminating in effusion.

Hydropericardium from organic disease.—The signs by which hydropericardium may be distinguished when complicated with organic disease, especially if this disease be seated in the heart, are even, if possible, more obscure than when simply the result of pericarditis. Corvisart, who must still be regarded as the

best author on this subject, has enumerated many signs by which the presence of effusion in the pericardium is indicated; yet a very cursory perusal will show us that they are deserving of little confidence. Patients, he observes, who suffer from hydropericardium have usually livid countenance, and black and livid lips; they experience great anxiety and oppression in the region of the heart; dyspnoea is so great as to threaten suffocation, especially when the patient assumes the horizontal position. In applying the hand to the heart, its action is found to be obscure and tumultuous, and the organ appears to beat through a soft body, or rather through a liquid placed between it and the walls of the thorax. Percussion produces a dull sound over a space commensurate with the extent of the effusion; and in some instances the left side over the region of the heart is more vaulted and elevated than the right. When the disease is of long duration, the strength fails, oedema of the extremities ensues, and, more rarely, a slight puffing over the anterior and left side of the chest.

Vieussens has mentioned oedema of the face and a dark leaden colour round the eye-lids, as more peculiarly indicating hydropericardium, but Testa justly regards these appearances as by no means peculiar to this affection. We have ourselves, in a former article, remarked that all dropsies which depend upon diseases of the chest for their origin, are usually indicated by oedema of the face; and hence it must be insufficient to mark this form of dropsy alone. On the other hand, Testa remarks, and the remark is worthy of notice, that hydropericardium very rarely exists without oedema of some part of the face; and that this oedema does not disappear before death, as does the oedema of the extremities.

Morgagni, Kreysig, and Testa have discussed at considerable length the value of individual symptoms; and they have all come to the same conclusion, viz. that they are all useless to distinguish hydropericardium from hydrothorax, and often from diseases in which no effusion is present. It would take up more space than ought to be allowed to this article, were we to go over the ground which they have trodden with so much ability; nor, considering that they at last arrive only at a negative conclusion, would any advantage be derived from such a discussion. Modern ingenuity has, however, introduced a new means of diagnosis, as well as revived and improved an old one. These are percussion and stethoscopic auscultation. With regard to the value of the first, no dependence can be placed upon it in this disease. It will indeed inform us, and that with tolerable accuracy, of the extent which the heart and pericardium occupy together when there has been no condensation of the lungs nor any material alteration in the change of parts; but should either of these occur, it would be useless even so far as we have indicated. But again, should no impediment arise from the source now referred to, percussion would do no more than intimate differences of

sound without informing us of the causes of such differences; whether, for instance, depending upon enlargement of the heart or effusion into the pericardium. Of this difficulty Corvisart himself was well aware.

The stethoscope may perhaps, in very practised hands, afford some information; and Dr. Hope thinks even eight ounces of fluid in the pericardium might be detected; "the sensation communicated to the hand and the stethoscope being that of an impulse transmitted through a fluid, and not of an organ striking the ribs immediately." We confess that we are not so sanguine in this respect as Dr. Hope; and we are much inclined to think, with Laennec, that less than a pint will scarcely afford any signs cognizable by auscultation.

The mistake made by Desault in tapping the pericardium may seem to corroborate our doubts. This distinguished surgeon made an opening into the chest between the sixth and seventh ribs of the left side near to the apex of the heart. He introduced his fingers into the chest, and perceived a cavity full of water, which he took for the pericardium. Dubois, Sue, and Dumangin, who were with him, examined the parts, and were of the same opinion; and Dessault then enlarging the opening, let nearly a pint of fluid escape. The fluid being discharged, he again introduced his finger into the aperture, and perceived a pointed conical body to strike the finger. The man, however, died in a few days; and the conical body was discovered to be the heart enveloped in the pericardium, which closely adhered to it; and the opening had been made into a cavity formed by a membrane which united the edge of the left lung to the pericardium. Here, then, the union of the pericardium to the heart, and the proximity of the fluid, would probably have obscured even this sensation of the heart beating through a fluid.

There is only one other sign which we feel called upon to consider, and this was proposed by Corvisart; but the suggestion has not been confirmed by any other author. Even this, however, is only applicable to very large collections of water. Corvisart had observed the phenomena now referred to in two instances. To employ his own words, "the beating of the heart is perceived sometimes to the right, sometimes to the left, or, to speak more clearly, in different parts of an extensive circle. Now this could not occur if the heart should be retained, as is natural, by the pericardium, whose cavity, proportioned to the volume of the organ, fixes the extent and direction of its motions. The pericardium must, therefore, be dilated, and this may happen in two ways; by augmentation in the volume of the heart itself, in which case, though the impulse of the heart might be stronger, and occupy a larger space, still it would strike against the same place; or by an accumulation of fluid in the pericardium, and then the heart, not being likewise dilated, would swim, as it were, freely into the fluid, and strike against different parts of the chest."

There can be no doubt that this is a very important observation; but Corvisart himself had only seen two cases in which it occurred: in one there were four pints of fluid, and in the other one pint. We have ourselves in vain endeavoured to detect the phenomenon, but have never yet been able; nor can this excite surprise, when it is remembered how large a quantity of fluid is probably necessary for its exhibition.

Morbid appearances.—These are seldom peculiar to hydropericardium; the essential circumstance of the disease being merely the presence of fluid in the pericardium. This fluid, we have already stated, varies much in colour; and the membrane itself sometimes exhibits traces of inflammation, increased vascularity, depositions of coagulable lymph, supuration, and ulceration. A more detailed account of the morbid appearances will properly fall under those diseases of which effusion is the consequence.

Treatment.—Of this we have very little to say in addition to what has been stated under the general head of Dropsy. Hydropericardium is so rarely, perhaps never, a solitary affection, that it cannot be treated upon any exclusive principles. Only one remedy may be proposed which it seems to us necessary to mention, and this is tapping the pericardium. This operation has been very rarely performed on the living subject; nor can we suppose it probable that it will again be proposed till experiment upon animals, and observations of injuries in the human subject, tending to prove that the membrane in question may be wounded with impunity, shall have afforded more justification for such an operation than at present exists. Certainly, however, we have no reason to believe that perfect adhesion of the pericardium is inconsistent with considerable enjoyment of life, although probably not with perfect health.

(John Darwall.)

HYDROPHOBIA.—When it becomes our duty to illustrate the nature and history of a disease, our thoughts instinctively turn themselves to the mass of obscurity which hangs over so great a majority of morbid affections; an obscurity which, under every advancement of science, diminishes but slowly, and which keeps almost all those maladies which were unintelligible two thousand years ago unintelligible still. Sometimes it may be doubted whether the disease is truly an original mischief, or merely the symptom of some other primitive disorder; whether it is not frequently confounded with affections happening to coincide with it only in a few occasional symptoms, or is not daily viewed in the most erroneous light with regard to its pathology and causes; or, in fine, whether proper evidence be not still wanting in these various respects, to enable physicians to establish any conclusion upon a firm and rational foundation. But whatever may have formerly been the case, it is no very common occurrence, at the present day, to have the doubts and hesitation of the writer upon

what may be called a disease of extreme notoriety extended to its very existence: such, however, literally happens with *hydrophobia*, of which many intelligent persons of different ages and countries have utterly denied the existence, except as a phrenitic or maniacal affection deriving its sole origin from the imagination of the patient,* or the injudicious treatment of his attendants. It seems necessary, therefore, on the threshold, to lay before the reader the grounds of our belief in the real existence of hydrophobia, reserving for future detail any other confirmatory circumstances which may present themselves as we proceed. Having briefly stated the general arguments, we shall be at liberty to carry him along with us to the history and treatment of the malady.

Our first argument is, simply, that numerous persons become affected with the disease, which is essentially characterized by *spasmodic contractions of the pharynx, and a difficulty of drinking*, (the latter generally believed to be a consequence of that spasm,) very soon after having been bitten by an animal labouring under a similar affection; and that these persons *invariably* go on from bad to worse, and finally die before the sixth day; their bodies upon dissection presenting appearances as uniform as can be expected from the great mechanical irritation produced on the adjacent secreting and circulating organs by the violent convulsions. On the other hand, we rarely observe the same train of symptoms preceded by any other cause. Now, of these victims some are mere infants, and cannot therefore be suffering under any mental impression; others are idiotical, others delirious; in neither of which states are the sources of mental terror long kept steadily in view. But in point of fact, a very large majority of hydrophobic patients, whose cases have been distinctly described in our medical records, are positively stated to have retained an adequate clearness of intellect till long after the terrible spasm and dread of fluids had established themselves, and in very many till the last moment of existence. Not a few of them have happened to be sensible, well-educated persons, of particularly strong minds. And seeing that we have for these facts the moral evidence of the entire faculty, of all ages and countries,—to assert in defiance of it that every hydrophobic patient is the victim of his own insane fears, does really seem to us to be begging the very question or proposition which those who make this assertion are bound to prove, although in direct contradiction to all medical testimony. Besides, if the cause consisted solely in a deep impression of fear, why should the disease, its presumed effect, intermit so frequently and in so many instances, as it is known to do? It cannot be said, therefore, that the proximate succession of the disease to the bite is the effect of mental emotion; and it will be easy to show that in most cases of this special class, not one of the other presumed

* C. Aurel. Lib. iii. c. xiii. p. 223.—White on Hydrophobia.

causes of hydrophobia spontanea, or rather non-rabida, were present. Consequently there is at least one form of hydrophobia of which the only constant known antecedent is the bite of a rabid animal; and this, therefore, in the present state of our knowledge, we are compelled to consider as the cause till another is shown. Secondly, the wound inflicted is not unfrequently found to hold a manifest relation to the characteristic symptoms. At first, these do not shew themselves, and the wound heals up kindly; but just before the time when the characteristic symptoms are about to appear, the cicatrix occupying the place of the wound often undergoes the remarkable alteration which we shall here for convenience technically name *recrudescence*. It swells, becomes red, livid, and painful, and the pain sometimes seems to shoot along the soft parts to a considerable distance from its origin. In other cases the wound opens of itself, and discharges a peculiar matter. Something similar is known to take place in traumatic tetanus; and although in this affection, as well as in hydrophobia, we cannot explain why the phenomenon of recrudescence does not occur in many fatal examples, yet we ought not therefore to deny that in those cases in which it does appear, the connexion between the recrudescence and the disease is most remarkable. Neither is it difficult to understand that, although the bite may, yet the recrudescence may not be essentially necessary to the appearance of hydrophobia; and hence we have full warrant to infer that the wound is the antecedent principally and determinately connected with the disease as an effect. Again, it is abundantly established by observation and experiment, that the bite of a dog produces, in animals of different species, a disease to all appearance hydrophobic; and on the other hand some experiments of M. Majendie, M. Breschet, and Mr. Earle, have led to the inference that the bite, or at least the saliva of man, may produce similar effects on the lower animals. These analogies are so forcible, that notwithstanding all the original differences between the economy of the human body and that of the lower orders of creation, we cannot refuse here to admit its application as an evidence, that upon man also the bite of a rabid dog will probably produce similar effects. Lastly, the universal persuasion and testimony of the people of every country in the world for more than two thousand years, affirming the connexion between the bite of mad dogs, and precisely the same characteristic phenomena of spasm in the throat and fear of drinking, is not to be passed over as a trivial or superstitious evidence of the reality of hydrophobia in man. It is not trivial, for the impression is deep; and a dread of pestilence is not more strongly implanted in the minds of men than the fear of hydrophobia: it is not superstitious, for it will be shown in what follows, that mankind came to a knowledge of this direful malady in the enlightened period between the days of Aristotle and the foundation of the great medical school of Alexandria; after Democritus and Hippocrates had long

freed the science from all connexion with superstition; and when the cities of Greece, Asia, Sicily, and Egypt, abounded with medical schools, and with professors alike distinguished by their cultivation of the healing art and their improvement of general philosophy. A coincidence of belief so universal cannot fairly be ascribed to accident, and is no more to be neutralized by the possible circumstance that *other causes* also may produce these symptoms, than the operation of marshy miasm in producing ague, from a well-known fact that other causes may also induce that disease, or reproduce it in the system after it has been to all appearance subdued for many years. It is still more illogical to infer, with some authors, that because the bite of a mad dog is not always followed by hydrophobia, it is therefore never succeeded by it. No known cause of disease whatever, not even the exhalations of the pest-house, the inoculation of variola, or the contact of scabies, produces its effect upon *every* person to whom it is daily applied; many escape, and probably, as in the case of small-pox, after vaccination, from previous changes in the system, which have rendered the body no longer susceptible of its influence. At all events, if we were to admit the conclusion drawn by late authors, we should be obliged to deny the influence of every exciting cause of disease, of which every successive effect, from the point to which it was first applied, to the parts ultimately involved in the affection, could not be fully traced.

Having premised these considerations, we hope we may now crave the attention of the most sceptical of our readers, while we examine in detail the principal circumstances which have come to the knowledge of the profession respecting this terrible affection.

The term *hydrophobia*, from ὕδωρ, *water*, and φόβος, *fear*, has been obviously compounded to express the principal symptom of the present disease, namely "a dread of swallowing water;" the latter fluid being taken by synecdoche as the most common liquid known then, in order to signify all other drinks as well as water. On a similar principle, the most characteristic symptom, namely the dread of swallowing liquids, or hydrophobia, seems to have been insensibly assumed as a name for the whole diversified series of phenomena which constitute the disease resulting from the bite of rabid animals. While ignorant of the proximate cause, physicians are content with naming diseases after one or more of their principal symptoms; and these denominations suffice for all the purposes of nomenclature, if they are so far prominent and uniform as readily to recal to the mind the thing signified. No medical man, we believe, ever heard the term hydrophobia, since its first reception as a word, without thinking of the disease produced by the bite of animals in the rabid state; and hence, though it may be our duty to put on record some of the more remarkable synonyms, we must say that we think very lightly of all the attempts which have been made since the days of Polybus to exchange it for one that may seem more expressive. Few

rational physicians expect to find the history of a disease condensed into a sort of essence in its name; and it ought not to be forgotten that the most comprehensive appellation is not always that which produces the most rapid suggestion—the principal end, we presume, of all individual nomenclature. Nevertheless, several distinguished French authors, of late years, have seemed obstinately bent upon some innovation; and we find, for example, in the excellent *Dictionnaire des Sciences Médicales*, and the still more recent *Dictionnaire de Médecine*, two standard works, the term hydrophobia appropriated to all cases exhibiting a dread of swallowing fluids, but *not* connected with the bite of a rabid animal; to designate, in short, every form of what is in Britain named simple hydrophobia. On the other hand, to the disease resulting from the contact of rabid animals, *rabies canina*, *rabies*, or *rage*, is in these works exclusively applied. Both terms are employed in a sense entirely conventional; for the dread of swallowing fluids, or hydrophobia, in the literal sense, is present almost alike in the simple and rabid forms of the disease; and it seems ridiculous to apply the epithet of *rabies canina* to a disease which has been produced by the bite of a wolf or a cat: and the term *rabies*, whether separate or joined with *canina*, involves the incurable fault of signifying furious delirium, a state of mind which is scarcely ever present in the disease. The ancients did not by any means fall short of the moderns in this curious research after an expressive appellation. Cælius Aurelianus allows the investigation a due share of his excellent chapter on hydrophobia; and so many authors have since adorned the pursuit with separate dissertations, that a fanciful person might almost imagine that in the name, as in the virus of hydrophobia there lurks something contagious. The ancient Greeks seem to have had a specific term for the madness of dogs, namely, *λύσσα* or *λύττα*, and we see it so employed by Homer, *Iliad* ix. 239. From this they formed a verb *λυσσάω* or *λυττάω*, and the adjectives *λυσσητὴρ*, *λυσσῶδης*, *rabidus*, *rabiosus*; terms which Homer makes his chiefs apply to Hector, while bearing all before him in the field of battle, and consequently presenting no bad image of that indiscriminate rage and effort at destruction generally displayed by the dog in a state of madness. The participle *λύττων* is likewise made use of by Plato in his *Republic*, to characterize a prince of ungovernable fury. Hence the term *κυνίλυσσα*, *canis rabies*, or *dog-madness*, has been repeatedly employed to designate this affection of the canine race; and it has been extended to the hydrophobia of man by Andreas and others. This, however, is still more extreme; for the translation of *κυνίλυσσα* is *dog-dog-madness*! an absurd pleonism, there being no *lyssa* except that of dogs. The very argument urged against the term hydrophobia, that dogs drink during their whole disease, ought to have taught writers that the disease of the dog is not the same as the disease he excites in man; and consequently that neither *lyssa* nor *cynolyssa*, nor

any other term which properly marks the disease of the dog, can rightly be applied to that of the human species. From the patient being unable to swallow any kind of moisture, some of the Greeks named it *hygrophobia* in preference to hydrophobia. Others gave it the appellation *phobodipsia*, to express the presence of thirst generally accompanying the dread of swallowing, or the dread of liquids themselves. By Polybus it is named *pneugydros*, because those affected are observed to shun or fly from water: Aurelianus translated this by the term *aquifuga*, in which, for obvious reasons, he has been little imitated. From two ambiguous passages in Hippocrates, hydrophobias have been called *brachypotæ*, i. e. *parvibubuli*, and the disease *brachypnosia*: but the word *βραχυς*, *short*, may also be applied to the intervals, and thus express in *brachypnosia* two very opposite things, either the act of drinking little, or of frequent drinking at *short* intervals. It is simply named *canis rabidi morsus* by Africanus and Avicenna. Mead proposed to name it *δυσκἀταποσια*, or difficulty of swallowing drink; and Rush, full of its relations to fever, will have it called the “hydrophobic state of malignant fever.” Quite recently, Dr. Good has attempted to restore the primitive Hellenic term *lyssa*, by inscribing the disease *entasia lyssa*.

Notwithstanding this profuse luxuriance of nomenclature, the term hydrophobia has always been and still is that by which this affection is distinguished by the rest of mankind, as well as by the best medical authors. It is the name employed by Celsus, Aurelianus, Galen, Boerhaave, Sauvages, Dessault, Linnæus, Vogel, Sagar, Cullen, and Pinel; and is still the only denomination by which the disease is known in the common language of the inhabitants of France and England, and under forms more or less translated amongst all the nations which inhabit Europe. Nor does there appear to us the least reason why it should be changed, since, as has been shewn above, it accurately answers in all the circumstances necessary to a simple name, and involves no theory with regard to the exciting cause or the intimate nature of the disease, but on the contrary seems a sort of etymological reduction of its essential character to the simplest terms; hence we venture to pronounce, that in defiance of all the efforts of ingenious men to the contrary, it never will be changed. Had it contained any intrinsic misrepresentation, any inherent source of fallacy, we should not have deemed the highest antiquity a sufficient reason for discussing its merits, far less for retaining it in a work of this description. But as it cannot be accused of either, and the reader was not to be left without some knowledge of its multiplied synonymes, we have endeavoured to bring them before him in as brief a manner as perspicuity would allow.

The nosological relations of hydrophobia appear scarcely less to have perplexed medical writers than those of its nomenclature. Concerning two radical facts all seem to be agreed;

namely, that there is one form of hydrophobia shortly succeeding to the bite of a rabid animal, and which is to be distinguished nosologically from all others; and secondly, that there are several slight evanescent forms of the hydrophobic spasm, which appear distinctly as mere incidental symptoms of hysteria and other common diseases, and are accompanied with little danger, and which, therefore, ought not to be classed as constituting any species or variety of the genus *hydrophobia*. But between these two extremes there occur an immense number of intermediate instances, resting upon testimony respecting which no rational doubt can be entertained; whose origin can be traced neither to injury from a rabid animal, nor to any previous disease existing in the system. For the moment, these may be divided into four different sections; first, those cases which arise almost immediately after the application of some obvious exciting cause, such as the bite of an animal not rabid, of the patient himself, a wound, or the influence of fear; secondly, those which are preceded by an obvious exciting cause, but between which and the appearance of the disease a considerable time intervenes; thirdly, those cases which appear to originate without any probable exciting cause having preceded; and fourthly, the numerous examples of hydrophobia which occur indeed after the bite of a rabid animal, but at an interval much beyond the period at which this peculiar injury is believed by the generality of physicians to be no longer capable of manifesting its powers. It is in the due allotment of these various candidates for nosological distribution that the difficulty of effecting a systematic arrangement of hydrophobia is mainly placed. It is not easy to invent a specific name which shall comprehend the whole or even the majority of them; for if, with M. Sauvages, we comprise them under the term *hydrophobia spontanea*, it is unanswerably replied, do you call the diseases of the first and second section spontaneous when their causes are obvious and acknowledged? nay, it is for you to prove that hydrophobia is ever generated spontaneously, since it is denied by the ablest authors. Again, if with Cullen we employ the term *simplex* to signify this series of complaints, we are instantly told there is no reason to believe that these are of a more simple nature, or involve fewer symptoms than the cases proceeding directly from the bite of a hydrophobic animal; and that if we make use of the word *simplex* merely in contra-distinction to the term *rabiosa*, such an application of it is entirely conventional. Nevertheless, as the terms *hydrophobia rabiosa* and *hydrophobia simplex* are very easily understood and contrasted with each other, especially since the latter term implies that the *hydrophobia rabiosa* is complicated (according to general belief) with the action of a poisonous virus, they are in common use in this country, and may occasionally be employed in the present article. As, however, all that seems wanted for the second species of hydrophobic affections is

such an epithet as decides that the cases arranged under it do not originate from the bite of a rabid animal, (the multiplicity of causes, and our total inability to trace these causes to their obvious effects, rendering every other appellation more or less exceptionable,) we humbly conceive that some such specific terms as the following would obviate every objection.

Genus Hydrophobia.—Great restlessness and hurry of mind; horror of and difficulty of drinking fluids, accompanied by clonic spasm of the pharynx, and spasmodic constriction of the muscles of the chest.

Species 1.—*Hydrophobia Lyssodes*, succeeding, within the period of two years, to the bite of an animal supposed to be rabid.

Species 2.—*Hydrophobia Paralyssodes*, not preceded, within the period of two years, by the bite of a rabid animal, or by any other than anomalous causes.

We shall thus reconcile popular nomenclature with the admirers of Dr. Good and of the language of Homer, avoid all verbal criticism, and enable future reasoners to arrange the different modifications which the disease assumes as *varieties* under their respective species; while the symptomatic imitations of the disease may be disposed as synonymes under an anomalous species of *hydrophobia symptomatica*, as has already been done by several eminent authors. In this manner we have—

Hydrophobia Lyssodes.—Varieties, *canina, felina, avicularis? insectorum? fomitus? saliva?*

Hydrophobia Paralyssodes.—Varieties, *traumatica, inflammatoria, phrenitica, meticulosa, nervosa, pathetica, febrilis*.

The symptomatic species are, *hysterica, febrilis, hypochondriaca, maniaca, melancholica, cynanchica, venenata*.

Let not our readers imagine that the reflection we have bestowed upon this arrangement is barren of all useful application. On the contrary, nothing is so common, on the narration of a new case, as to hear it asked,—But is it certain that the case is one of genuine hydrophobia? Were the pathognomonic symptoms present? Was it not rather one of those fatal spasmodic affections of the throat in the production of which animal virus has no share? And a person unacquainted with nosological arrangement often finds it difficult to answer such queries, as he must necessarily waver both with regard to the date at which the poison may still work its effects, and the circumstances which connect the approach of the animal with the ultimate symptoms, if he do not even hesitate much about the symptoms themselves. From the usual neglect of such an arrangement may fairly be traced that scepticism regarding hydrophobia which we so often meet with among members of the profession sufficiently sensible and unprejudiced, but whose attention has been otherwise directed. It appears unnecessary to dilate upon the criticisms which have been made by authors upon the group of symptoms

which have been assumed by various nosologists, as constituting the character of the disease. Nothing was more natural than that the fears of mankind regarding the communication of this formidable affection,—fears which may be traced to the time of Aristotle,—should clothe it in all the terrors suggested by an apprehension so justly vindicated by what they observed to take place in other animals. Posterity has added very little in this respect to the horrible train of suffering already so graphically described in the pages of Aurelianus; and if some of them, since exploded by the critical science of our own day, were believed in and quoted as characteristic by the nosologists who have preceded us, these writers seem hardly to be chargeable, in fairness, with more blame than the misfortune of having lived before these errors were discovered. They are not answerable for their age; and excluding these faults, enough still remains in their definitions to enable us to recognise the disease they describe; and if there did not, it would still be very poor logic to infer that, because their definitions had failed, the disease was indefinable or did not exist. The hydrophobia of Cullen was the same as that of which we treat, although he erroneously believed it to be characterised by a desire to bite and a loathing of liquids. In the last place, it was equally illogical to consider the occasional absence of some one of the characteristic symptoms a sufficient reason for withholding the general name of hydrophobia from the disease, and yet this has been a great stumbling-block with some of our most ingenious writers. Such reasoning is correct only in abstract mathematics and abstract logical discussion, where the things defined, being pure entities of imagination, can suffer no gradation without demanding a corresponding change of terms. But in nature, and more especially in organic beings, every thing is gradation and change; and no genus of plants or animals, and still less of diseases, could be subdivided into its species and varieties which do actually exist in nature, were this rule to be rigidly observed. No disease, for example, can be better defined by nosologists than pneumonia; yet how often do the physicians of the present day, by the aid of the stethoscope, proximate auscultation, and other well-known forms of minute observation, discover latent modifications of it in every degree of advancement, which but a few years ago would only have come to their knowledge long after by the appearance of adhesions which they might accidentally observe on dissection. Instances might be multiplied to almost any number; but it will be more practically useful to observe that a new case of disease is to be classed by the physician rather according to its general coincidence with the symptoms of some well-known type or form, than according to the presence or absence of some individual symptom; a circumstance which, in the varied irritability of the whole system or of single organs, is often quite fortuitous: and the writer who should deny that the fatal disease suc-

ceeding to the bite of a mad cat, for example, is not hydrophobia because it is accompanied with scarcely any dread of water, although it agrees in all other indications, may seem to reason with the metaphysical accuracy and the scrupulous definition which distinguish a geometer, but we should distrust his knowledge of the principles of physic, a science which requires great allowance to be made for incidental variations.

From the earliest antiquity of which we have any record, the dog has been the companion of man. In the book of Exodus cattle torn by wild beasts are ordered not to be eaten, but to be given to the "dogs,"—an expression which proves that these animals were already the constant attendants of man, and assisted in his pastoral labours. It was no doubt the impurity of their food that has rendered their name synonymous with every thing that is impure or vile throughout the whole of the scriptures. Still there is no allusion made to hydrophobic disease any where in the sacred volume, a circumstance which is perhaps best explained by the fact that, even down to the present day, canine madness is unknown in Syria and Egypt. We have already said that the disease was well known to Homer, and applied by him, with his usual critical exactness of similitude, to the indiscriminate havoc with which Hector sweeps through the battle-field of his enemies. Thus,—

—————"Ἐκτωρ δὲ μέγα σθίνει βλαμεινῶν
Μαίνεται ἐκπάρῳας, πίνουσ' αἰ, οὐδέ τι τίει
Ἄνείρας, οὐδέ θεούς· κρατερὴ δὲ ἔλυσσα δίδουκεν.

Iliad ix. 237.

Τούτῳ δ' οὐ δύναμαι βαλῆειν νύνα λυσσητῆρα.

Iliad viii. 299.

—————ὁ λυσσώδης, φλογὶ εἰκελος, ἡγεμονεύει
Ἐκτωρ.

Iliad xiii. 53.

The poet, with much propriety, puts these words into the mouth of Ajax his enemy, for *dog* was already a term of reproach among the Greeks* as well as the Jews. He no where mentions the disease as actually existing in man. In the writings of Hippocrates, there occur at least two passages, the singular language of which makes it not improbable that the physician of Cos had seen hydrophobia, and was then speaking of its symptoms, but that he did not recognise it as a separate disease, and merely considered it as a variety of phrenitis or mania, affections with which it has always been but too easily confounded:—Οἱ φρενιτικοὶ βραχυπῶται, ἴφου καθαπτόμενοι, τρομώδεις. Prædict. lib. i. p. 69. Οἱ φρενιτικοὶ βραχυπῶται, ἴφου καθαπτόμενοι, τρομώδεις ἢ σπασμώδεις. Prenot. sect. ii. p. 131. We transcribe the passages, but are unwilling to strain them so far as Aurelianus and others have done; indeed, no indisputable mention of the disease occurs any where in his works, either in the genuine or the sus-

* Iliad. i. 225.

pected. There is almost certain evidence, however, that the disease was well known to his friend and contemporary Democritus; for we are told by Cælius Aurelianus, that, in his book upon *Opisthotonos*, Democritus distinctly treats both of the hydrophobic disease in man, and its origin from the bite of a rabid animal, and that he seemed to consider it as a variety of tetanus, an opinion which has been embraced by many of the moderns:—"For Democritus, who was contemporary with Hippocrates, not only makes mention of this affection, but even describes its cause when speaking of *opisthotonos*."* And in another place, speaking of the cause of hydrophobia, "Indeed Democritus, whilst treating of *emprosthotonos*, ascribes the seat of the disease to the nerves;"† by which in his time were chiefly meant the tendons, ligaments, and other white tissues. Now we learn from several passages in Gellius, the contemporary of this well informed author, that the works of Democritus were still extant in his time, and of frequent reference and high estimation; and it seems most improbable that Aurelianus would have referred to the chapters in which the passages were sure to be sought for, if he had wished to misquote, or to mislead the disputants in a controversy which, he informs us, was then become hackneyed, and the merits of which he appears to consider with perfect coolness. Democritus, be it remembered, was a great traveller, and may have become acquainted with the communication of hydrophobia to man in countries situated beyond that sphere of information to which the industry of the great father of medicine had ever extended. At all events his opinion made little impression on the Greeks; for we find Aristotle, nearly a century afterward, asserting that the hydrophobia may be communicated from one animal to another, but not to man. "Dogs," he affirms, "are subject to madness, cynanche, and a sort of gout or lameness. The first of these diseases renders them rabid or furious, and all the animals which they bite become equally affected with madness, with the exception of man. The malady occasions the death of the dogs affected, and of every animal that is bitten by another animal, still excepting man."‡ This repeated negation of the actual existence of human hydrophobia would scarcely have been made by so grave a writer as the Stagyræite, unless he had heard the contrary asserted under some degree of authority; nor could he have safely committed it to writing, unless he had previously contemplated the different circumstances. Indeed Professor Sprengel seems to think that Euripides, who was prior even to Democritus, alludes to it in the *Bacchæ*, v. 337. "Acteon

..... mourut de l'hydrophobie.* C'est la plus ancienne trace que nous trouvons de cette cruelle maladie."† Upon referring to the *Bacchæ*, however, we confess we cannot discover the most remote trace of an allusion to hydrophobia. In that part of the drama to which Sprengel refers, Cadmus is counselling Pentheus to join in the worship of Bacchus and Semele, to dread the danger of contemning the Gods, and, as an example, to take warning by the fate of Actæon. The words are—

ὄρας τὸν Ἀκταίωνος ἄθλιον μῦθον
ὃν ὠμίοντο σκύλακες, ἃς ἰδὲ φάτο,
διεσπασάντο, κρείσσον ἐν κινήσει
Ἀρτέμιδος εἶναι κομπάσαντ', ἐν ὄργῳ.

Which may be thus simply translated into English:

Thou seest the wretched fate of vain Actæon,
All torn and scattered by the raw-fed hounds
He cherished; meanwhile boasting in the chase
To excel the great Diana, forest queen.

Still the testimony of Apollodorus would be curious, if it evinced that human hydrophobia was known and believed in shortly after the time of Aristotle, and long before the age of Asclepiades; a fact which is strongly corroborated by what we have already stated from Aurelianus, of the opinions respecting hydrophobia maintained by Andreas, who flourished two hundred and four years before Christ. Apollodorus, whose words follow, lived in Egypt under Ptolemy Physcon about one hundred and thirty-three years before Christ, more than half a century before the period at which Asclepiades flourished. His work is a history of the Gods, wherein, describing the death of Actæon, he says, — οἱ πλείονες λέγουσι ὅτι τὴν Ἀρτέμιιν λουομένην εἶδε. καὶ φασὶ τὸν θεὸν παραχρῆμα αὐτοῦ τὴν μορφὴν εἰς ἔλαφον ἀλλάξαι. καὶ τοῖς ἐπομένοις αὐτῷ πεντήκοντα κυσὶν ἐμβάλλειν λύσαν, ὑφ' ὧν κατὰ ἄνθρωπον ἐβρώθη. Artemidorus, as we learn from the *Symposiaca* of Plutarch, must therefore have been mistaken, in asserting that Asclepiades the Bithynian was the first who introduced this disease to public notice. This Artemidorus, who lived down to about the time of Adrian, must not be confounded with the follower of Erasistratus, of the same name, who was a native of Sida, and who flourished, according to Sprengel, two hundred and twenty-three years before Christ, and is celebrated by Aurelianus for his doctrine respecting the seat of hydrophobia, which he placed in the stomach. In this he was partly opposed by Gaius, a follower of Herophilus, and who wrote a treatise on hydrophobia, or the "dread of water," about the same time; and who seems to have been inclined to place the seat of the disease in the nervous system, and more especially in the pneumo-gastric portion of the *par vagum*.‡ The nerves were divided by Erasistratus into nerves of sense and nerves of motion; the nerves of sense origi-

* "Etenim Democritus, qui Hippocrati convixit, non solum hanc memoravit passionem, sed etiam ejus causam tradidit, cum de *opisthotonicis* scriberet." Lib. iii. 15.

† "Equidem Democritus, cum de *Emprosthotonicis* diceret, nervos inquit." Ibid.

‡ Hist. Anim. lib. viii. c. 22.

* Euripid. *Bacch.* v. 335.—Apollodor. lib. iii. c. iv. p. 189.

† Histoire de la Médecine, tom. i. p. 117.

‡ "Gaius, Herophili sectator, libro quo de timore

nated from the brain itself, the nerves of motion from its membranes; and in the latter number no doubt was reckoned the eighth pair, as we see it in this passage. Asclepiades, or at least the greater number of his followers, referred the chief seat of hydrophobia to the membrane of the brain; the irritation of which, according to him, was the principal cause of all mental diseases, as phrenitis, lethargy, epilepsy.* Others of them maintained that it chiefly occupied the diaphragm, as that membrane was much affected with pain during the disease. But Artorius, the most distinguished of his followers, who afterwards became the physician and familiar friend of Augustus, but perished at sea shortly after the battle of Actium, reverted to the doctrine of Artemidorus, and assigned to the stomach the honour of being the original seat of the disease.

We have thus been enabled, by the aid of modern research, to demonstrate to the reader, 1. that the hydrophobia of dogs has been known from the earliest ages; 2. that there is every reason to believe that human hydrophobia was considered as an established disease by Democritus and Polybus, and had been heard of by Aristotle; 3. that its nature and treatment were discussed in the school of Erasistratus by his immediate followers; 4. and lastly, that Asclepiades does not seem to have added any important observation to what was already known on the subject, though his followers rather than himself propounded some unsatisfactory conjectures as to the seat of hydrophobia. Nevertheless, the distinct account of the nature and treatment of this disease delivered by Celsus, who was an auditor of Themison, the successor of Asclepiades, at Rome, evinces rapid progress towards an accurate knowledge of this formidable affection, from the no very distant period at which it most probably became generally known to the world through the medium of the school of Alexandria. Instead of quoting a work so common, we shall merely extract the substance of what was known to this admirable eclectic. The disease named hydrophobia usually arises from the bite of a rabid dog, the wound of which has not been properly treated by preventive measures. The suffering is terrible, the patient being tormented at the same time with the dread and the desire of water; and under this he gradually sinks with very little chance of recovery. The only known remedy is to throw him unawares into a pond before he sees the water, where, if he cannot swim, he will swallow a sufficiency of water while he sinks and rises by his own efforts; but if he swims, the same end is to be attained by the assistants dipping him under water from time to time. In this way the thirst and dread of water are both made to disappear. There is

aquæ scripsit, ait cerebrum et ejus membranam pati. Etenim voluntario motu servientes nervi atque stomachum colligantes, intium vel originem inde sumpsisse noscuntur.—Aur. ib.

* *Aurelianus.*

some danger, however, lest the enfeebled patient should be carried off by cramps or convulsions from the effects of the cold water; to avoid which he is immediately to be put into warm oil. Free doses of opiates combined with aromatics and antispasmodics may be given either as antidotes or remedies; but if the disease has already supervened, they may be given in pills in preference to the fluid form. When the dog which inflicts the bite is known to be mad, the virus is to be extracted by the cupping glass. The wound is then to be cauterized, unless it happen to be in muscular or nervous parts: if the cautery cannot be permitted, bloodletting will be useful. The sore after the cautery may be dressed with the usual irritants; but if the cautery has not been employed, the wound must be treated with more active escharotics, and finally healed up. Immediately after the accident, some send the patient to the bath, where he is made to sweat freely, and lay open the wound by scarification in order that the poison may escape in greater quantity, and follow up the practice with a liberal allowance of the strongest wine, which is an antidote to all poisons.

Such was the state of knowledge with respect to this disease in the Augustan age, and Sprengel thinks it owed a considerable share of its precision to the singular circumstance of Themison, the distinguished professional teacher of Celsus, and of nearly all the medical men then living, having himself become affected with simple hydrophobia, and narrowly escaped; an event which we may be sure would be copiously alluded to in his lectures, although Aurelianus gravely asserts that he was always threatened with a fresh attack the moment he began to describe the disease. “*Ferunt,*” says Dioscorides, “*Themisonem medicum amico aquam timentem, in eandem incidisse affectionem, nec nisi post multos labores servatum.*”*

It seems almost certain that Dioscorides was contemporary with Themison, and he would not have omitted the practice of bloodletting in hydrophobia recommended by Celsus and Eudemus, had it been known to him; nor yet the ingenious expedient of endeavouring to sweat out the poison by means of the hot-bath, or the formidable auxiliary of repeated submersion in cold water. Let us give Dioscorides, however, with the vulgar, to the reign of Nero, and we shall see that terror had already begun to magnify the natural horrors of hydrophobia. “*Some patients,*” he affirms, “*bark like dogs, fly upon and bite all near them, and like the former animals communicate the disease to those unfortunate members of their own species whom they have torn.*” Like Celsus, he makes distinct mention of the poisonous virus presumed to be injected by the teeth of the dog, and orders it to be sucked out by the mouth or by the cupping-glass, which is to be strongly ex-

* *Lib. vi. de canis morsu, p. 733.*

hausted for this purpose. His precepts for scarification are precise as well as judicious; he insists on the excision of the bitten part, and in certain cases recommends amputation. In these severe precautions he speaks from his own experience, by which he has preserved many persons that were bitten, from the super-vention of hydrophobia, which disease, when once established, he deems quite incurable. He is the first writer now extant who declares that he had himself seen and treated the disease. The absurdities concerning hydrophobia collected by the elder Pliny only merit allusion in so far as they evince that the terror and exaggeration it produced were much greater among the vulgar than among physicians; but the perusal of the able treatise on hydrophobia which occurs in Cælius Aurelianus affords sufficient proof that with the latter also the alarm was progressive. He, or the author he has been supposed to translate, lived about the same time with Galen, in an age still very learned, about the year of Christ 200-230. Not only do his hydrophobic patients bark like dogs, and communicate the disease by biting to man, but "their voice has a barking tone, and they roll their bodies up from head to heel, in the spiral manner assumed by the dog in laying himself to rest: they walk with the level, slow movement of persons carrying water in a full vessel; the tongue projects from the mouth; the bile that is vomited is most frequently black. A moribund patient ran upon a mad dog whom chance presented, and bit him furiously, then rolled himself up like a ball and expired. To inhale the air contaminated by the breath of the rabid dog was sufficient to produce the disease," &c. Still we are not to measure the importance of Aurelianus by the scale of his errors, or, to speak more truly, by the errors of his age; his description of the phenomena of the disease is for the most part surprisingly faithful; indeed so exquisitely graphic, that to copy it here would be to anticipate much we have to say in the succeeding history of the symptoms. His notions of the prognosis and diagnosis are generally just and sagacious; and though his method of cure derives a very distinct character from the theories of his own sect, (the methodists,) yet he has added with an impartial hand the treatment recommended by others. Lastly, he has given a very instructive view of the different controversies respecting hydrophobia which prevailed in his time, and compared them with each other with an intelligent fidelity which, in spite of his barbarous Latin, is always highly interesting. No student of hydrophobia should omit to read this part of his work. Galen, his contemporary, and in some measure his predecessor, was a great collector of what had been done before him, and his opinions swayed the schools for 1300 years after his death. It may be sufficient, then, to say that the sentiments of Galen with regard to hydrophobia were those of all mankind at the revival of letters. He appears to have turned his powerful mind to

this subject with particular attention. He invented several antidotes against hydrophobia; one of which, the ashes of the river crab, he assures us he had never known to fail. He compares the operation of the canine virus to the action of slow poisons, which, though given daily, only produce a visible effect after a certain time. The virus is like wood placed near the fire, which becomes gradually hotter and hotter, and at length bursts into flame and is consumed. The virus is by no means idle in the wound, although it does not betray itself by the least symptom for many months, in one case known to himself, for a whole year. Canine virus thus proceeding step by step slowly generates a disease, which sinks deeply into the solids, and is therefore so much the more tractable, just as we see taking place in leucæ and other obstinate forms of leprosy. The dread of water he conceives to arise from mental aberration, which he calls *impaired judgment*. In addition to his antidotes, he orders the excision of the part bitten to be made of a circular form, in order that every part tainted may be removed, and the disk thus laid open is to be kept raw by escharotics for forty days. Alyssum calycinum, or madwort, is recommended for a cure; as also the liver of the mad-dog which had bitten the patient. He gives a tolerably fair account of the signs of rabies in dogs, at least in the more violent cases. He attributes the original occurrence of hydrophobia among dogs to the spontaneous corruption of their fluids; and as his theory of the origin of diseases, now better known by the name of the humoral pathology, referred almost all complaints to a similar degeneration of the humours, he finds occasion to recur frequently with triumph to this instance of the canine virus. On one occasion he gravely draws a parallel between the self-generated poison that produces hydrophobia, and the self-generated poison that, as he imagines, produces phrenitis. The reader will at once observe that the notion of spontaneous hydrophobia, so long maintained, and not yet entirely relinquished by some authors, as by M. Rochoux, is a legitimate portion of one of the most exploded doctrines of Galen, and is supported by no better evidence at present than it was in the time of its ingenious author. With the exception of some oriental flourishes, such as the presence of little dogs in the urine of hydrophobic patients, we find the Arabians copy the Greeks with great closeness. But as some of them, Avicenna for example, are more systematic and more copious than the Greeks themselves, they may still be read with advantage. Thus the last-named author notices both the peculiar apoplectic termination of hydrophobia, and the changes occasionally affecting the urinary organs; facts which scarcely occur in the Greek or Roman writers. Africanus, a learned follower of both in the darkest age of our era, has added nothing new.

We have thus come to modern times, and in these we have not been able to resolve the question at what time arose the custom of

smothering hydrophobic patients by means of beds or pillows. Of this horrid practice no trace is to be discovered before the sixteenth century; and next to the burning of witches, it affords the most pregnant example of fear, purely imaginary, becoming the cause of the most detestable public crimes. The apprehension of danger from the breath, saliva, or bite of the unfortunate sufferer, combined, it would seem, with an obscure notion of the disease being attended with something like demoniacal possession, were the original apologies for resorting to this cruel security, the consummation of which the morbidly timid patient dreaded from the approach of every person that entered his apartment or advanced to his bed. Hence the fury, the repugnance, and frequent attempts to injure the by-standers, so prominent in the histories of hydrophobia recorded during the two last centuries, and so rare in the present. Professional scepticism and critical inquiry, by shewing that these fears were entirely without foundation, have alone relieved humanity from the reproach of these delusions, and the sufferers from the unspeakable horror of being murdered on their death-beds, often by the hands of those whom of all others they most loved; for the frequent opportunities of inspection after death, afforded by the now zealously cultivated science of anatomy, has never cast any additional light on the subject.

In presenting a view of the symptoms of rabid hydrophobia, we are enabled to derive less benefit from arranging the phenomena according to the order of time than in most other diseases. The latent period is so irregular in point of duration, and affords so few marks of the presence of disease in the system, that some able physicians have felt inclined altogether to dispute its connexion with hydrophobia. The stage of recrudescence, however, observes a tolerably uniform relation towards the succeeding disease, since it generally occurs a few days before the latter is constituted; but then it is often wanting, and even when present, seems sometimes a precursor, sometimes a symptom, of the third stage. Nay, the pharyngeal spasm and dread of fluids, the nervous agitation and gastro-pneumonic symptoms, have all been described as occurring in almost every possible order of succession in different individuals. The true key to this endless diversity is found in the fact, that by far the greater number of the symptoms which fall to be recorded are of a secondary character, in consequence of which the time and intensity with which they appear are greatly regulated by the intensity and time at which the cardinal symptom they follow has showed itself. These cardinal symptoms are five in number: first, a depressed, excited, or altered state of the nervous system of the individual; second, a depressed, excited, or altered state of the mind; third, fever; fourth, difficulty of swallowing fluids; fifth, gastro-pneumonic symptoms. From one or other of these every remaining symptom is believed to flow. But as observation teaches us that any one of

these may be the first to show itself, and any other of them may follow it in succession, it is easy to discover, without resorting to the law of permutation, that the varieties in this respect presented by the cases actually recorded must be very numerous, though all coinciding in one common circumstance,—that whatever may happen to be the order in which these cardinal symptoms supervene, they never extinguish each other, or again disappear. Still, as it is the nature of the human mind to pass forwards from cause to effect, and consequently according to the progress of time, we shall adhere to established practice in this respect, and tracing the symptoms in that order in which they most generally occur, rest satisfied with having endeavoured to select the course which presented fewest faults. We divide this disease, therefore, into three periods, namely, the stage of *delitescence*, the stage of *recrudescence*, and the stage of *spasm*.

First stage, or delitescence.—In the first stage there are generally few symptoms to be observed, except such as are usually found to occur from the bite of the most healthy animals. The wound, whether dressed, or, as often happens, neglected, heals up kindly, leaving a cicatrix, which differs in no respect from that which supervenes to a similar wound inflicted by the teeth of an animal in the best health. It may be remarked that in many cases the injuries inflicted by hydrophobic animals do not involve any extensive laceration, a circumstance which may be attributed to the sickness of the animal and the unsteadiness of purpose during this malady. The younger Cuvier has observed that the great characteristic of the animal mind, as compared to that of man, appears to be the facility with which it passes into the state of rage or fury, and remains governed by its influence; but in the hydrophobic dog this instinct seems often to be modified into a snappish irritability, by which the creature is easily induced to bite, but does not inflict the wound with much energy, nor attempt to repeat it. Huntsmen, we are told by Rush, accordingly divide the rabies of dogs into the *sullen* and the *furious* hydrophobia, in which latter form the lacerations inflicted by the dog are deep, large, and frequently repeated. In another place we shall endeavour to shew the effect of education and of the original disposition of the animal in determining the frequency of the sullen and the furious forms of the disease; but for an example of extreme injury of this kind the reader is referred to Dr. Hamilton's Appendix, page 325. The man had a large wound on the throat, which laid the trachea quite bare to a considerable extent, and which likewise appeared to be considerably bruised; one on the cheek, which enlarged the mouth a full inch; a smaller one lower on the chin, and another, lower than the former one, on the throat, which evidently proved that the animal had changed his hold.

In most cases, however, pain has been felt in the cicatrix a considerable time after the accident; but such a feeling is so frequent in the seat of wounds recently healed, that its

occasional presence after the bite of mad animals ought not perhaps to be considered as any thing singular or characteristic. In several examples upon record* slight fever came on very soon after the accident, and continued till the appearance of the hydrophobia, which in such instances supervened in the course of a few days. But as in general the period of delitescence in genuine hydrophobia is seldom shorter than forty days, or longer than twenty-four months, such cases have by many writers been considered to originate purely from the fever or the mechanical irritation, and consequently referred to the non-rabid species. We may take an opportunity to remark that we have here, as well as in our definition, assumed two years as the longest period of delitescence, because it seems to be the opinion maintained by the most rational medical writers upon this subject, from Dioscorides downwards; and because Drs. J. Hunter, R. Hamilton, and S. Bardsley, have shewn that all the credible cases on record occurred before the eighteenth month; likewise because we have heard of no instance of recrudescence taking place in the wound after this period; and, finally, because, so just is the instinctive impression left by experience, that every medical man would hesitate were he to hear in the course of his practice of an individual case of hydrophobia referred to a cause much anterior to this limit. This, however, we may do, without pretending to assert that it is impossible for the cause of hydrophobia to lurk longer in the system than two years; but we say that the connexion between the bite and the spasm has not been satisfactorily traced upwards beyond this point; and that if we were to take a thousand persons who had survived the bite of a mad dog during two years, we should not at any time afterwards find one of these persons become affected with hydrophobia without the infliction of a new bite.

In the period which intervenes between the healing of the wound and the second stage, little satisfactory has been observed; a few individuals have become retired, gloomy, and melancholy, the countenance expressing considerable anxiety; but as the pulse, skin, and other indexes of the functions continue natural, it seems impossible to affirm that these signs of depression are not the sole offspring of mental anxiety regarding the hazard in which they in general know but too well their life is placed by the accident. The other symptoms attributed to this stage by authors seem purely accidental.

Second stage, or recrudescence.—The commencement of this period is deservedly one of great alarm to the patient, and accordingly it is one about which the medical man is for the most part consulted early, and the progress of which, therefore, he is furnished with a fair opportunity of observing. It may be added that, when it occurs, the patient and the practitioner have each a longer warning, and for that reason a more promising chance of obtaining a

cure of the hydrophobia which generally follows; although some have said that the recrudescence itself is an indication merely of the greater activity of the virus and the more exasperated form under which the malady is about to appear. At first a pain is perceived in the cicatrix, at times attended with itching, but in general resembling the aching of rheumatism, which in some cases shoots to some distance along the limb affected, and in others degenerates into a species of torpor in the part itself. In one case under our own care the sensation of the thumb bitten was that of torpor, and such extreme rigidity that its joint could not be bent: meanwhile the sensation of pain was in the neck and shoulder. The thumb was without redness or swelling. Sometimes the cicatrix is merely affected with a sense of coldness, with stiffness, extending along the limb; and in one case the arm thus affected became paralysed. In a few cases the pain does not begin precisely in the wound, but in some part near the trunk, as the shoulder or hip. The scar becomes red, swollen, sometimes livid, and in one case was surrounded by a papular eruption;* and in the course of a short time it opens and discharges a peculiar ichor. Meanwhile flying convulsive pains are felt in various parts of the body. As the disease proceeds, the patient, according to Dr. Marcet, complains of pains shooting from the wound to the region of the heart, and in general both he and Babington, with Professor Callisen, have observed in different cases that these recrudescent pains seem always to follow the course of the nerves, and do certainly never inflame or irritate the lymphatic vessels and glands in the vicinity, though passing in a parallel course towards the trunk. Thus a bite on the upper extremity produced pain of the arm and shoulder, but did not affect the axillary glands; and from a similar wound of the leg the pain was conveyed to the hip and loins, but no irritation of the saphenic systems of lymphatics, or of the glands of the ham and groin, were observed to take place. We may add to the above, the entire absence of any fact contrary to this observation in the works of the numerous authors who have written on the subject. In some cases the wound does not open, but a sense of torpor, pain, and occasionally of roughness in the integuments, shoots along the limb which has been wounded. In an instructive case of this kind related by Mr. Oldknow, of Nottingham, in the fifth volume of the *Edinburgh Journal*, though the patient was wounded in three distinct places by the same dog, namely, the scrotum, the thigh, and the left hand, yet the uneasy sensations were perceived in the arm alone, *though last bitten*; as if the hydrophobic, like tetanic action, were most easily excited by irritation of the extremities. These recrudescent symptoms took place forty-two days after the bite, and four days before the hydrophobia became confirmed. It is seldom that they occur longer than six days

* *Edin. Med. Surg. Journ.* vol. iii. p. 414.

* *Edin. Med. Surg. Journ.* 1807.

before the disease becomes marked, and the most general term of their appearance seems to be two or three days before hydrophobia supervenes. In one case which we attended, and which we have also described, the patient died on the seventh day after the pain commenced in the part bitten, and fifty-six hours after the hydrophobia had distinctly commenced. The recrudescence symptoms, therefore, occupied more than four days. With regard to this point, however, and to the relative frequency with which the symptoms of the second stage are present or absent, no very precise information can be obtained. They are rarely mentioned in the more ancient cases, and occur so frequently in those of modern date, that the difference can only be attributed to the older writers having considered the state of the cicatrix with little attention. By Aurelianus, however, and consequently by the authors whose collective views he represents, this symptom was beheld in a most important light: "Præpatitur enim ea pars, quæ morsu fuerit vexata; unde initium denique passionem (s. c. hydrophobicam) sumere, nemo negat." This, however, is not the only medical observation that seems for a time to have suffered a certain degree of oblivion. In point of fact, it has been proved by Dr. Hamilton that by far the greater number of hydrophobic cases commence between the thirtieth and fifty-ninth day after the bite, and consequently at a time when the wound produced at first by the animal, and afterwards enlarged by the surgeon, is in many cases scarcely healed up, and almost always retains that high degree of sensibility proper to recent wounds, and which generally gives rise to considerable pain upon any great change taking place in the system; often, indeed, from mere vicissitudes of the weather. In several instances the pain has been perceived immediately after a debauch, and in one remarkable example it darted into the part the moment the patient was told that another person bitten by the same dog had died of hydrophobia. Though there can be no doubt, therefore, of the actual occurrence of this recrudescence in examples taking place long after all the superinduced sensibility of the part had disappeared, or where re-opening, discharge, or eruption had taken place around it; yet it is not easy to come to a conclusion in cases where the circumstances have been different. A late distinguished nosologist, Dr. Good, has received this phenomenon of recrudescence, which without doubt is very general, into his definition of hydrophobia; and we have judged it necessary therefore to explain, as far as was attainable, the modification to which this character is frequently subjected.

Third stage, or hydrophobic phenomena.—

This assemblage of symptoms, from its fatal event, the pity, consternation, and horror excited in beholders, and its obvious diversity from all other maladies afflicting the human race, whilst the latent and recrudescence periods which succeed the application of the exciting cause differ little from any other morbid states of the system, has very generally been consi-

dered as constituting the whole generic disease of hydrophobia. In strict accuracy, however, this whole group is to be considered merely as a symptom which may be resolved into separate parts, but yet simply indicates a single stage, such as is well known to occur symptomatic of many states of disease or irritation in the system; nor is there any better reason that the patient's health is entire and the disease quiescent, during the two first periods, than in that period of calm composure, facility of drinking and swallowing, absence of pain and mental suffering, which appear so generally for some time before the sudden death of the patient, and which sometimes, as in Dr. Johnston's case, interposes itself in the midst of the disease under the form of remission. We are in no hurry to anticipate the different views that have been taken of the mode or train of action by which the bite of a rabid animal produces this horrible disease; being different, they cannot all be true, and could therefore render us little service here. But, however unknown, they exert an operation on the day in which they render the disease cognizable to the senses, which they could not put forth before, and have therefore been undergoing a series of changes themselves, or operating a series of changes in the constitution from which has resulted this increase of power. From the moment of the bite, then, a morbid action is in progress and accumulation, and he who would deny this may equally deny that the death of the patient, in many instances so visibly disjoined from the paroxysmal state, is owing to the same cause; he must deny, also, that it produces the return of this state after the remission. Yet this series of paroxysmal symptoms is that to which the attention of the practitioner is chiefly directed, and he is, therefore, very easily led to consider it as the essential part of the disease. For some days previous to that on which the disease presents itself, the countenance of the patient indicates anxiety, and he is himself conscious of a restless, rather depressed state of mind. The eyebrows are contracted, the face tumid, and there is headach with tremors. In a certain number of cases a sense of general chillness, like that preceding fever, is perceived, before any more marked symptoms appear. He is sometimes drowsy through the day, and in other instances has his sleep broken and disturbed in the night. The disagreeable feelings originating from the cicatrix go on to increase; occasional sighing, unaccountable flushes and rigors of momentary duration, and in a few cases slight febrile symptoms succeed. A sudden loathing of food has been repeatedly observed at this period, the patient being sometimes surprised at finding his usual appetite converted into aversion on sitting down to table; and in other instances he becomes suddenly affected with nausea or vomiting. In some persons the peculiar pain, usually referred to the scrobiculus cordis and diaphragm, has been first perceived at this instant, and in one or two cases appeared to originate in the violent efforts made to vomit; but the symptom gene-

rally comes on considerably later. A sense of stiffness, gradually becoming painful, is now felt in the back part of the neck, and extending forwards along the basis of the jaw towards the root of the tongue and the pomum Adami of the larynx. Sighing is more frequent; the respiration is easily hurried; and there is often some headach complained of at this period. If the patient attempt to swallow any thing, he finds himself unable to perform that office; the matters introduced are rejected with violence from the mouth, and the muscles of the mouth and pharynx are seen by the bystanders to be thrown into violent convulsions, in which not unfrequently the muscles of the face participate. This is the pharyngeal or hydrophobic spasm, which, by creating a dread of swallowing fluids, has given name to the disease; for although patients are generally able to swallow food and other solid substances with tolerable facility, yet any attempt at drinking, be the fluid what it may, is almost sure to be followed by the spasm and sense of suffocation. Though in most cases the painful spasm is the only cause of the dread of swallowing fluids, and eventually of the fluids swallowed; yet this fear may, in its turn, become the cause of the spasm, the patient, by endeavouring to avoid its recurrence, often originating the very motions which produce it. The same error of function is frequently observed to take place in these parts in persons who find a natural difficulty in swallowing pills, in painful cynanche, and in eating and drinking while the mind is much engaged upon something else. The parts are scarcely quite voluntary, as is proved by its being impossible to make them perform their office when they are altogether dry; and accordingly our knowledge of the position of objects within them derived from their mere sensation is always obscure, and the efforts made in consequence sometimes prove misdirected or fallacious. In drinking it is not necessary that greater efforts should be made than in eating; but from the facility with which fluids glide along, they often present a larger mass, which requires a greater effort to be propelled at once into the pharynx by the organs of deglutition; and as they easily slide into the smallest cranny, they render the closest approximation of the two lips of the glottis, and of the epiglottis upon these again, indispensably necessary; and as the movement of drinking is generally of the continuous kind, the oppression of the respiratory processes which it produces is always considerable, even in health, as is demonstrated by the strong inspirations rendered necessary after a large draught. They must eventually, however, be much greater in hydrophobia, where difficult respiration and irritability of the larynx and fauces are already at their maximum. Besides, in the movement of swallowing, the larynx is drawn upwards and forwards, and the root of the tongue thrown backwards over the larynx, a circumstance which must greatly increase the tendency to suffocation resulting as described; hence the very great augmentation of this spasm while

the larynx is being drawn up. As the disease proceeds, this symptom becomes more severe, and calls in a more extensive train of concomitant evils; of which number are laborious respiration, sighing, vomiting, flatulent eructations, a sense of a ball or pressure on the throat, urgent thirst, a burning pain along the course of the spine, neck, and vertebral column. The increase of saliva at this period seems to arise partly from the vehement irritation of the salivary glands which is produced by these movements, as a similar state occurs in many healthy persons, when induced from anger or loquacity to move the muscular parts in the basis of the jaw with great activity. In other cases, however, the saliva is said to precede the spasm, particularly in animals; and in all such instances it must be referred to the specific effect of the poison upon the salivary organs, a series of glands which, of all others in the body, most readily yield their secretion to a new stimulus. The best authors are agreed that it is the experience of the painful sensations thus produced which in general gives rise to this fear of drinking, which is afterwards, by a too natural process of association, extended to liquids themselves, and finally to polished bodies, to light, to cold, to fresh air, to names or sounds, or indeed to any thing that serves to suggest to the mind of the patient the horrible idea of his sufferings while attempting to swallow fluids. In this opinion we feel ourselves obliged to coincide, as well from the result of our own experience as from the consideration of a number of recently well attested cases, in which the patients not only denied every antecedent dread of fluids, but made many spirited and occasionally successful efforts to overcome that spasmodic resistance which alone prevented their transmission to the stomach. If we add to this the fact of the dread of water disappearing during the intermissions which have occurred in some cases, and in that final remission which occasionally takes place before death, we shall see that the spasm is the chief cause of the dread of water; and that if the latter had depended, as some think, upon a peculiar modification of the mind produced by the bite, it would not be so frequently absent. The disease is now fairly constituted; the patient is tormented with thirst, every attempt to allay which by drinking only serves to bring a new and more severe paroxysm, the convulsions of which often extend themselves to every muscle of the body, whether of head, trunk, or extremities. There are vomiting of a greenish or dark-coloured matter, eructations, inflation of the stomach and bowels, great pain in the region of the diaphragm, restlessness, heat of skin, and sometimes considerable frequency of pulse. The latter has counted as high as one hundred and fifty beats in a minute. In addition to the headach and singular cast of countenance already mentioned, a peculiar brightness, 'a wild and sparkling expression' of the eye, compared by authors to that observed in incipient ebriety, and a retraction of the angles of the mouth approaching to the sardonic grin, and referred to the well known sympathy sub-

sisting between the diaphragm and zygomatic muscles, are symptoms confined to the head and face. The latter is sometimes suffused, sometimes pale, or varied with large, irregular, ruddy spots. A great plurality of testimonies has satisfactorily established that a certain change or alienation of mind takes place during this disease; but in what that alienation consists, how it is to be described, or where it has its origin, are questions which have all been violently disputed. The most general form under which it appears is a certain promptitude of action and loquacity while engaged in conversation, which is chiefly evinced by the patient rendering longer answers and more circumstantial explanations than he might naturally be expected to do at another time; yet his ideas are said to be perfectly coherent, his reasoning just and consecutive. But the susceptibility of the mind also, as well as of the body, becomes greatly increased, and in this point the analogy with incipient ebriety fails, with the exception perhaps of a very few instances. This morbid susceptibility is manifested by a tendency to take alarm at inadequate causes, and to form suspicions without any probable grounds; and, in fact, the dread of water itself and of every thing suggesting the *idea of water*, may in certain subjects be merely another of its indications. High delirium is seldom present except during the extreme violence of a paroxysm, and then but rarely; and as to the states of mental alienation, vulgarly designated by the terms mania and melancholia, they can scarcely ever be said to be present in this disease, however universally the former opinion may once have been diffused. It is fair, however, to remark that the reasoning faculties cannot be altogether entire in a patient who indulges undue suspicion, and who, contrary to previous habit, launches into verbose harangues upon every trifling occasion; for it seems to be the very essence of sanity to perceive justly the relation of its possessor to present external circumstances, which relation is by such persons evidently neglected. We dare not, however, go to the length of proposing for this peculiar susceptibility of mind the term of *lyssomania*, so many patients having expired of this disease without having exhibited the least symptom of suspicion or loquacity. There is still ground for apprehending that their fears are in some instances owing to the vulgar apprehensions of the rough treatment under which the last scene of hydrophobia was till very lately generally believed to terminate. Thus, taking one of many instances, the patient Groves, whose case is related by Dr. H. Maclean of Sudbury, in 1792, had imbibed the idea that "he was to be smothered between beds, and in the most earnest manner entreated us not to shorten his sufferings in this manner." Indeed, only twenty years before, an attempt had been made by the attendants in the Leicester Infirmary to destroy a hydrophobic boy, Nourse, in a similar manner, and they were only prevented from effecting their horrid purpose by the timely intervention of Dr. Vaughan. Groves was a

powerful man, in the prime of life; and when we consider the characteristic timidity of hydrophobic patients, we may well conceive that a very great number must have suffered under this apprehension, without daring to give it utterance. So late as 1814, Dr. Albers of Bremen was sent for by a hydrophobic patient in order to bleed her to death, and thereby release her from her sufferings; and she seems to have considered this as quite within the line of the doctor's ordinary practice. The loquacity, though in most instances the result of the peculiar nervous excitement present, may in others arise from the new and terrific circumstances under which the patient is placed, something like what is often observed in persons led forth to execution; and it is no doubt greatly promoted by the accelerated circulation and intensity of sensation which accompany the hydrophobic spasm. Both are symptoms, however, very generally present, and it is under that view they are brought into notice here.

The whole of the symptoms above expressed may establish themselves in a few hours after their commencement, though in general they can scarcely be said to become so fully developed before the second day; and death most usually happens on this and the third, according to Hamilton's table, although in a considerable number it has taken place after twenty, twenty-four, or thirty-six hours; and in others it does not happen before the fifth day, and in some few instances not before the eighth or ninth day. Hence there is seldom much time afforded for contemplation of the more exasperated form into which they subsequently pass, but yet they have been observed and described by medical writers with great exactness, and have gradually become separated from the fictions with which they were combined by ancient authors. The sense of thirst, and sometimes also of hunger, become much more urgent; there is frequent vomiting of a green or bilious matter, which does not relieve the pain of stomach or the tension of the præcordia. Besides these greenish and black fluids, which are probably different forms of bile, authors have described the matter vomited as sometimes glairy, sometimes cineritious, and sometimes resembling coagulated blood. The patient is tormented with a burning heat and dryness in the fauces; and the saliva, no longer receiving its due admixture of watery fluid, becomes thick, viscid, and adhesive, and frequently accumulating about the glottis of the patient, and thereby threatening immediate strangulation, causes the unhappy sufferer to make every effort to blow it forward out of the mouth. It is the sound made by this effort which produces that faint resemblance to the barking of a dog, and that appearance of froth adhering to the lips of the patient, which have been so absurdly described as characteristic of the disease. Surgeons, who know that suffocation is produced in good health by a little blood from the tonsils being allowed to accumulate about the glottis, will be at no loss to comprehend how this acrid saliva must irritate the sensitive and frequently inflamed fauces of hydrophobic patients, and

make them anxiously endeavour to remove it. Besides, they are often at this period seen to labour under such extreme difficulty of breathing that bronchotomy has been practised for their relief; and it is probably to this cause also we are to attribute the anomalous movement of the cheeks and lips described in some patients, and the occasional presence of black blood in the left side of the heart after death. The restlessness, the tremors, the guttural and general convulsions, return now with much more frequency, and are elicited by the slightest causes; the mind becomes much agitated, and in several cases seems quite unsettled during the paroxysms; impatience of the slightest contact with the skin, of light, and of sound, is frequently present to a remarkable degree; and when the pulse and heat of skin are considerable, a person who saw hydrophobia in this stage for the first time might easily mistake it for phrenitis; but the skin is generally cool, the urine natural, the blood yields no buffy coat, the pain of head is inconsiderable, and the delirium transient. The pulse varies extremely in velocity, but is generally quick, and has been counted as high as 150; it is seldom, though sometimes, strong and hard; and the feeling it impresses on the finger as to fullness, creeping, &c., is by no means uniform. Meantime, the powers of nature are gradually suffering exhaustion, under these repeated paroxysms of action, in which muscle and nerve seem alike to participate. The patient, who usually complains of debility from the commencement, whatever force he may be found to exert during the paroxysm, appears to become rapidly weaker, until at length, after one or more desperate exacerbations, life is extinguished. In a few cases he unexpectedly becomes tranquil, and most of his sufferings subside or vanish; he can eat, nay, drink, or converse with facility; and former objects, associated with the excruciating torture of attempting to swallow liquids, no longer disturb his feelings. From this calm he sinks into repose, and suddenly waking from his sleep, expires. Sometimes, on attempting any new movement, he dies suddenly; but in many cases he is carried off from this deceitful calm by a sudden and violent convulsion. In the great majority there is no calm or intermission, but the paroxysms, becoming more and more violent, at length carry off the patient. The muscles remain rigid long after death, and the eyes in some instances retain their peculiar brightness, and the iris its contractility, till the following day (*Gorcy*); nay, in one case the pupil, which had remained constantly dilated during the disease, returned to its natural dimensions after death.

Such is the most general progress of the disease, but there are many varieties observed to occur in different individuals, a circumstance which has given rise to many controversies. At times hydrophobia intermits, and at others remits. From the histories on record, it would appear that these interruptions tend somewhat to prolong the duration of the disease, but have no distinct effect in rendering it less fatal. This conclusion, however, is not universal, and the

circumstances which lead to these temporary suspensions of hydrophobia are not entirely unknown. The alvine secretion, perspiration, and urine, seem generally to continue in a natural state throughout the disease; but the skin frequently becomes intensely sensible, causing the patient to start or scream with horror on the slightest touch. The settling of a fly upon the surface of the body, the contact of cold air, or of heated air moving in a current, produce the same insufferable sensations and the same tremors. Perhaps the dread expressed of mirrors and smooth objects is rather to be attributed to the patient's associating with them the effects of cold upon this irritability of the skin, than with the torture experienced in the act of drinking. We may probably refer to the same source, the observation of Eudemus (A. C. 23), that the trickling of a tear down the cheek will sometimes excite the paroxysm. In a few instances, however, the skin is hot and dry; in others, it is harsh to the feel, but without heat; and in one or two cases it is described as appearing livid; sometimes it is described as covered with a profuse perspiration. In Dr. Johnston's case, the bowels were confined throughout the whole disease, and so closely constricted was the extremity of the rectum by spasm, that every attempt of the medical man to introduce the clyster-pipe proved fruitless, although made with abundant firmness. In nearly all the cases that have come to our knowledge, the urine was natural, a most remarkable circumstance considering the waste constantly going on from the blood by the saliva, and by the pulmonary and cutaneous exhalations, and the impossibility of introducing a fresh supply of moisture. In a few instances, however, it has been remarked to be scanty, in others of a greenish, and in others of a pale lemon colour. Generally speaking, the organs which excrete this fluid have scarcely been known to be affected with spasm in hydrophobia, although this is a common symptom in hysteria and hypochondriasis, diseases which it resembles in many particulars. In one of Mead's cases, however, (the first,) there was difficulty of passing urine: the patient had "strangury to a great degree, exciting cries on attempting to pass urine; the urine was as well coloured as ordinary." In short, the glandular organs appear to be but slightly affected, and perhaps never primarily in hydrophobia, with the exception of the salivary and lachrymal apparatus. Some persons experience an extreme soreness in the scalp on its being touched, and others, as we have seen, have a similar aversion to contact on any part of their surface, declaring that it hurts them; others experience more or less of pain in the region of the larynx or trachea, during the whole or part of the disease; and some have suffered pain and enlargement of the thyroid gland, generally on one side only. During the latter stages of some forms of hydrophobia, the lymphatic glands around the basis of the jaw became sensibly enlarged. Cases are related, in which the first indication of spasmodic action about the neck does not occur in the

muscles attached to the basis of the skull, but in the root of the tongue, in the muscles originating from the os hyoides, and it is described as commencing by a sense of rigidity and stiffness merely in that position: on looking into the throat, for the most part nothing is to be seen; but in other instances turgescence and the general signs of inflammation are distinctly visible upon simple inspection. Externally, in some rare instances, the larynx, or the thyroid gland, or the submaxillary gland, have appeared to the medical attendants to be somewhat enlarged.

It has already been observed that those bitten by cats have seldom the dread of water, or the difficulty of drinking it to any great degree; so that to many of them the fable of Tantalus, if ever it alluded to hydrophobia, becomes an allegory misapplied. Such is the notion of Dr. Good, who probably omitted the fear of water from his definition on this account; but the proposition is not rigorously true. In Dr. Vaughan's case of a boy bitten by a cat, he "sobbed deeply at the sight of water, turning away with perturbation." Mr. Bellamy also, and the patient described by Dr. White, (*Hamilton*, pp. 340, 430,) were both distinctly affected with the hydrophobic spasm; and perhaps the only reason for this supposed peculiarity in the bite of the cat, and which has induced this learned nosologist to create two new species, 1, the *rabies felina*, with little spasm, and, 2, the *rabies canina*, with much spasm, has been the simple fact that the cases on record of hydrophobia from cats are too few to afford a firm basis for any inference. In other cases there is no nervous agitation, in others no vomiting, in others no tracheal irritation, in others no fever; many have the respiration nearly free to the last; some await their end with considerable tranquillity, their mind being little disturbed during the whole scene: while, besides those affected in the manner we have described, there are others who become delirious from the middle period of the disease.

Finally, it is not the modification of one individual symptom that is to fix the attention of the medical observers in hydrophobia, but the changes in one or other of those great original groups to which we have said each individual must belong; the chills and flushes, the tremors, the excessive cutaneous tenderness, the intolerance of light, of sound, of pungent smells, the preternatural activity and force of action, the tendency to certain motions, as leaping upwards, running backwards, climbing; the facial, guttural, and thoracic spasms; the great increase of muscular force, the general convulsions, and at length paralysis of the limbs; the amaurosis, and mental aberration, are symptoms many in number and various in aspect, but all flowing distinctly from one source, a nervous system irritated and finally exhausted by the action of the poison: the priapism, spasmodic contraction of the cremaster muscles, and involuntary emissions, which occasionally occur, have the same origin. That satyriasis ever attended these last symptoms in the hydrophobic patients of Britain, we have not been able to learn. There

are good reasons for thinking it never did, as being familiarly mentioned by the ancients, it was not likely to be passed over in the great exactness of modern description. French writers, however, assert that it frequently occurs so combined in that country; and the respectable Portal bears witness to his having seen several instances of furor uterinus occurring in hydrophobic women. This is probably another example of variety resulting from the diversity of national education. Many irritations of the nervous centre are known to produce these symptoms, and if they are sometimes occasioned in hydrophobia by spasmodic contraction of the perineal muscles, the origin of that spasm is the same. Neither must it be forgotten that the reasoning powers, the present conversation, and the previous knowledge of a patient, as well as his physical power of enduring pain, will considerably modify all the mental phenomena; and when the fever is vehement, there will be a further change of these phenomena from that cause. The respiratory phenomena must likewise vary according to these leading symptoms; the *sighing* will have more relation to the fever; the *sobbing* more to the nerves. The theory of sighing is well known; but that of sobbing is evidently of the nervous class, and has been traced by Sir Charles Bell to the sole action of the respiratory system of nerves. It is exactly the movement produced by throwing cold water suddenly upon the naked shoulders, and was long since described as such by practical authors. (*Hamilton*, App.) This affection of the respiratory class of nerves lent some countenance to the peculiar hostility of the rabid virus to the eighth pair, to which we have elsewhere alluded.

The changes which take place in the functions of the organs of sense are abundantly curious. At first there is a distinct increase of their power, the exercise of which seems far from disagreeable to the patient himself; and hence the wandering aspect and rapid movements of his eye: he listens to sounds, and detects smells, which no one else can observe. Sometimes he speaks of a disagreeable smell exhaling from the wound, and possibly with correctness, it being no great argument to the contrary that the bystanders cannot perceive it. M. Majendie attended a hydrophobic patient, who, though born deaf and dumb, heard very distinctly during the paroxysms. Neither is the sense of touch at first disagreeable; and one patient whom we attended compared it to tickling. But in a short time they all become affected with pain, and finally with anæsthesia or paralysis; the patient hears indifferently, has numbness in certain parts, the pupil becomes dilated, the sight indistinct, and at length lost. This progress from an agreeable excitement to pain and collapse seems to mark the progress of some mischief accumulating upon the nervous system. The supervention of partial paralysis, paraplegia, and even hemiplegia, tends much to confirm the same opinion; nay, in the case just alluded to there was an universal paralysis, or, in other words, an apoplexy; and

we remarked in our notes at the time, that it differed in no respect from a severe case of apoplexy, except that the stertorous breathing was less.

Nothing can be more various than the different frequency of hydrophobia in different countries and seasons. In South America, Syria, Egypt, and Barbary, it is said to be very unfrequent, and indeed scarcely known; even in Britain, where the population is dense, and the chances of multiplying the disorder correspondingly increased, hydrophobia is a somewhat rare disease; and we may meet every day with experienced practitioners who have never seen it. In the mortality bills given in Dr. Willan's able work on the diseases of London, there occurs only one case in the course of five years; and in Edinburgh there has not occurred a single case in the last twenty-five years. On the contrary, it is pretty frequent in many countries on the continent of Europe, as will appear by the following curious statistical table of the ravages made by human hydrophobia in the kingdom of Prussia:

Years	1810,	1811,	1812,	1813,	1814,
Deaths	104,	117,	101,	85,	127,
Years	1815,	1816,	1817,	1818,	1819,
Deaths	79,	201,	228,	268,	356.*

From this it appears that the deaths in ten years amounted to 1666, or to 166 yearly, which considerably exceeds the number of authenticated cases known to have been put on record throughout the world when Dr. Hamilton wrote his book in 1798. The deaths were most frequent in the provinces of Marienwerder, (228,) and Bromberg, (162.) In Breslau it was 90, in Oppeln 53, in Trier 46, in Aachen 58. On the contrary, not a single case occurred in Stralsund; and it was rare (5) in Dusseldorf and in several other places. Hufeland observes that those provinces in which it is most abundant are contiguous to forests containing wolves, to the forests of the Ardennes, of Russia, and of Poland. Hydrophobia is very rare in Sweden. Odhelius declares that the disease is so uncommon that up to his time, 1777, not a single case had been communicated to the Academy of Sciences. Crete, and one or two other of the Grecian islands, have been described by the ancients as particularly obnoxious to this disease, whilst it was rare in the adjacent continents; but this was probably the mere result of the great number of dogs reared in them, the breed of these islands being celebrated all over the world. It is the salacious nature of this animal, and the absence of all limits upon continents to the extent of his promiscuous intercourse, that gives rise to the difference so long observed between the dogs of islands and those of the main land. In islands, the number of breeds and consequently the number of mixtures have a limit, and in small islands like those of the Mediterranean, a sufficiently narrow one: consequently a character of breed once fixed will run small hazard of

materially degenerating; for every new tendency will be more or less in an intermediate relation between the breed and the medium character of all the other races. It seems not improbable that the innate fierceness and love of independence, with its consequences, suicide, ardour for general liberty, and aversion to foreigners, which philosophers have long imputed to the human inhabitants of islands, particularly those of Britain and Japan, may be owing to a similar circumscription of family intermixture. Analogous facts may be observed in the Celts and Jews; but we omit this consideration to remark that the same insular circumstances that give rise to the peculiar characters of these far-famed breeds of dogs, may also have generated and propagated a tendency to hydrophobia in those animals. In the Manchester Royal Infirmary, which may be considered the central hospital to nearly half a million of population, very few cases of undisputed hydrophobia have occurred within the last eight years, and in private practice we can only hear of ten cases which have occurred during the same time.

Hydrophobia attacks every sex and age without discrimination. Soranus, the ancient methodic physician, had observed it occurring in infants at the breast, and this remark has been confirmed in later times. No temperament, no strength or weakness of body, no mode of existence or habit of life is spared; and, upon the strictest investigation, it does not appear that any one of these circumstances, though they are known so materially to modify even diseases resulting from specific contagion, has ever produced the least modification of the symptoms in those attacked with hydrophobia. It seems, in particular, to invade alike every class of society: the superior intelligence, cleanliness, and comfort, of the classes raised above the necessity of daily labour, is found to afford them no security; and, considering that their exposure to the exciting cause must be considerably less, there appears to be a full proportion of cases occurring in such persons put on record in the writings of physicians. It must be observed, however, that a great number of those who have been bitten, escape the disease, and that this good fortune cannot be without a cause. Blacks are obnoxious to hydrophobia as well as whites, but in what proportion to the latter has not been ascertained. Some have inconsiderately asserted that men of the Arab race are exempted from its ravages; but this is sufficiently confuted by the familiarity with which Avicenna, and other Arabian physicians speak of the disease.

In studying hydrophobia we must avoid a source of error from which false reasoning and many false facts have flowed from the time of Cælius Aurelianus; who seems entitled to some praise for the invention of a sophism that has been so much employed by his successors, and so well received by the mass of mankind. "If Homer," says he, "knew of dogs, and of the hydrophobic disease to which they are subject, he must also have known of the hydrophobic disease of man; for the dis-

* Edin. Med. Surg. Journ. 1824.

ease of the dog is the cause of the disease in man; and if he knew of the cause of the disease, he must of necessity have known the disease itself; for where the cause was present, the effect would naturally follow." By a parity of reasoning it has been inferred that wherever dog-madness is, there human hydrophobia must also be; that the climates which produce the one must produce the other, and that the symptoms which are produced in the one must be produced or imitated in the other. It is chiefly owing to these extravagant conclusions that we are often unable to discover whether an author is speaking of the disease in man, or of the disease in dogs; that we find all the fabulous symptoms imputed to the mad dog by the first writers, described in the hydrophobia of man by medical authors comparatively modern; and that, up to the present hour, the influence of climate or local position is supposed to exert some influence on the production of this disease. Two things, however, are clear; first, that a place may be for a length of time free from hydrophobia, and yet suffer greatly afterwards from the direct demonstrable importation of that malady; and, secondly, that the disease may be raging amongst the canine race of a district, where formerly cases of human hydrophobia have occurred, and do afterwards occur; and yet from the activity of the police, chance, which gives up only every twenty-fifth person to the confirmed disease, and another series of chances comprehending the confinement, detection, or death of the animal himself, may combine to render the canine disease devoid of all bad consequences at that time, without our being forced to suppose that climate or atmosphere have in the smallest degree interfered. As these facts seem important, we shall illustrate them by a brief example. In 1798, Dr. Hamilton assures us, on good authority, that canine madness had not been seen in the island of Jamaica within the last fifty years.

In 1822, that excellent observer, Dr. James Thomson, of St. Thomas in the Vale in that island, put upon record the following decisive facts regarding the same subject in the Edinburgh Journal. Dr. Thomson had an opportunity of observing the cases of two hydrophobic patients in Jamaica, whose malady resulted from the bite of rabid animals. Upon dissection he did not omit the spinal marrow; but except slight inflammation of the throat, not the smallest appearance of disease was manifested. Neither did he find any thing in the bodies of three different animals which died mad. Simple heat will not create the disease, as it is not more common in tropical regions. Some years ago almost all the dogs in St. Domingo were infected, from the bites of some rabid animals that were brought from America; and it has, since that period, been repeatedly traced to infection from that quarter. It has also been repeatedly communicated to the race of dogs in this island. The dogs kept for the destruction of rats upon sugar estates, are occasionally seized with madness. Dr. Thomson once saw an instance of a goat bitten

by a dog, and where mercury was given. The poor creature ran at the mouth terribly for some days; but soon afterwards died mad. He has been informed that herds of swine become occasionally mad, biting and tearing each other. It is obvious, therefore, that the disease has been imported into Jamaica since 1798, at which time it is supposed the island had enjoyed an immunity from it of fifty years; and this immunity, which authors had attributed to climate, was in reality the effect of accident. Insular situation rendered it easy to exterminate the dreadful visitant, and a large period of freedom from its ravages succeeded.

What relation the disease may have to the different seasons of the year, or to various modifications of the weather, will be more properly considered amongst its causes.

Causes.—The most careful investigation by the anatomist has hitherto discovered nothing in the dissection of the bodies of those destroyed by hydrophobia, which throws the least light upon the theory of its cause. The bodies of many patients who expired under frightful sufferings, have not exhibited the slightest indication of disease. In others, an early and careful examination of the fauces discovered no morbid appearance during life; and the few organic changes which have been described in other cases are too various in locality and degree among themselves, and being mere traces of inflammation, are too easily explained as the consequences of the violent straining, and spasmodic action of these parts, and of the acrid secretion, or halitus, whose combined irritation they undergo during the latter part of the disease, to enable us to deduce from them any conclusions as to the seat or the mode through which the exciting cause works out its fatal effects. The details, therefore, afforded by pathological anatomy, we shall do better to reserve for another place; and we now proceed to consider the causes of hydrophobia in their triple relation of *pre-disposing, remote, and proximate*.

With respect to predisposing causes, we have nothing but the most loose analogies: persons of the nervous temperament, and of a feeble habit of body, and melancholic and irritable individuals, are occasionally liable to obstructions of the great functions of the throat, breathing and deglutition; and these impediments appear universally to be of the spasmodic kind. The globus hystericus, the dysphagia sicca, the hydrophobic spasm, spasmodic croup, and even spasmodic dysphagia, are all members of this family, and exhibit the common character of supervening suddenly; not unfrequently indeed from mental emotion also, or gastric irritation, particularly dyspepsia. But these are merely evanescent accidents, and have no right to be considered as having the same origin with the terrible spasms of human hydrophobia. On the contrary, we have already seen that the hydrophobia of man occurs in every possible temperament, age, and habit, and it is therefore most illogical to infer that they have any thing

in common in their origin. In plain truth the excitement which produces the spasms in question, produces the same effects in the most robust, sedate, and fixed of human constitutions; and, taking their own view of the matter, who is it, of all such speculators, that would dare to assert that he knows the exact measure of force exerted by the cause of hydrophobia? Or that he states on demonstrable grounds, that there ever exists in human bodies an irritability too small in degree for it to produce its specific effects? We say then, that the notion of a nervous or melancholic temperament predisposing to human hydrophobia is an *ex post facto* observation, drawn from what is seen in the symptoms after the disease is formed, and not a genuine clinical remark chronicled in the latent stages, and confirmed by comparison of cases. The few other predisposing causes that have been occasionally alluded to are too improbable to deserve notice in the present day; being those causes which have been noticed as producing the non-rabid hydrophobia, which are afterwards to be disposed of, and which may very well be allowed to remain in the class of exciting causes of that distinct species, till they have been shown to act as predisposing causes of rabid hydrophobia; an assumption altogether gratuitous, and of which at present there does not exist one instance upon record.

As we advance to the *exciting* causes, however, our information acquires a more satisfactory character. That the bite of a dog, labouring under a particular form of madness, is often succeeded in man by the symptoms above described, and in animals by a disease remarkably analogous, and equally fatal, is a proposition which is confirmed by the testimony of all ages and nations, and has never been called in question by any respectable writer. But numberless, and many of them indeed extremely interesting, questions have arisen out of this admitted fact, and are still occasionally proposed for our solution, with regard to the time, manner, and circumstances under which the apparently trifling injury, which precedes, produces the fatal consequences which follow. Does the disease ensue from the influence of fear alone? And, if so, is this fear created by the terrible appearance of the animals, by the prejudices of the patient, by the apprehension of the medical attendant, or by all these terrors acting together? Is it the simple result of laceration extending, as in tetanus, its irritation from the part wounded to the more susceptible portions of the nervous and muscular system? If so, are we to consider it merely as a form of tetanus, or rather as a different disease originating from a parallel cause? And in either case, would the claws, or other rigid parts of the animal produce similar effects by a scratch? If so, why do the symptoms of hydrophobia differ from those of tetanus? Again, is the disease communicated by a poison or virus which passes into the wound, during infliction of the bite? If so, does it come from the saliva or the tooth, or is it the saliva itself in

a morbid state? Is it absorbed into the system, or does it remain in the wound? If absorbed, does it modify the whole blood and secretions, or merely the secretions of the saliva; and does it imbue this in man with the power of communicating the disease? If the virus is not absorbed, by what mysterious operation does it induce distant parts of the system to create a similar virus, and at length to undergo such vehement and fatal action? Into what condition is it passing during the state of recrudescence; and how does it bring to pass the phenomena which constitute this state? How long or how short a time may it remain latent in the human system? Can it act by inhalation or mere absorption? Can man communicate it to his kind, or to other animals? These are questions which, however numerous, require to be considered in the etiology of the present disease.

We have already shown that the disease does not arise from the influence of fear alone, nor is it ever imaginary. The rabid animal is often quite unsuspected when he inflicts the wound; and in other cases the patient is in a condition incapable of appreciating danger, or of connecting in his mind the former injury with his present feelings. The case of Richard Brown, in the *Edinburgh Journal* for 1810, affords important testimony to this effect. To the inquiry, is hydrophobia merely a tetanic affection, originating in the laceration produced? A fuller answer will be returned in the diagnosis; but order meanwhile makes it necessary to remark, that tetanus and hydrophobia must either be the same or two different diseases. If they are the same, where is the locked jaw and tonic spasm of tetanus in the latter? The frothy, overflowing saliva, the thirst, vomiting, clonic guttural spasm, tremors, and mental aberration of hydrophobia in the former? In short, what medical man ever mistook one for the other since the days of Democritus? If they are different diseases, why attempt to class them together under the same appellation? No man pretends to explain distinctly how a lacerated wound excites the phenomena of tetanus; and we should be committing the old logical blunder *ignotum exponere per ignotius*, if we coincided with the attempt to explain the operation of the cause of hydrophobia, of which we know so very little, by the theory of tetanus, of which we know nothing. If it be said that there is an analogy between the exciting causes, the spasmodic paroxysms, and the fatal results of the two diseases; it may be answered that this analogy entirely fails in the diagnostic particulars above enumerated; and perhaps still more essentially in the fact, that tetanus never engenders madness or a desire of biting in the lower animals, and is never communicated by a bite from one to another. This last circumstance renders it impossible for us to consider hydrophobia as produced and matured by any series of proximate actions parallel to those which produce tetanus. By the argument of exclusion, therefore, we are obliged to admit the principle of a virus, for

we know of no other mode, and we shall find that, besides this necessity, the absolute existence of such a virus is all but demonstrated by many positive analogies. The saliva of the animal inflicting the bite is evidently changed in its nature, being morbidly abundant, viscid, and frothy; wounds inflicted through clothes are less frequently followed by the disease than in those which occur in bare parts, as the hands and face; thus in Oldknow's case above quoted, no recrudescence took place in the scrotum or thigh, because, in wounding these parts, the teeth of the animal had been wiped as it were by passing through the person's clothes, before they could reach the soft parts within; but it took place in the hand, though the part last bitten, because the animal, which had been forced to let go its former hold only after using considerable violence, had time to shut his mouth and wet his teeth again in saliva, before inflicting the wound. Introduced by a wound into carnivorous animals, it evidently reproduces a similar saliva wherever it excites the disease. In one omnivorous animal, man, the same fact has been proved by Magendie, by means of injection; and from the testimony of Dr. Thomson above quoted, and many other writers, the same thing seems probable with regard to another, the hog, when introduced by a bite; and the symptoms of the malady ensuing, with the addition of the biting tendency, peculiarly resemble those which take place in man. Amongst the herbivorous animals a large salivary apparatus is necessary for their food, which does not undergo its ultimate chymification in the first stomach; and it is not impossible that the changes produced upon these organs by the rabid poison may be too small to generate the new virus. After all, the virus may be there, but in too dilute and feeble a state to manifest itself in the few rude experiments which have yet been made by physiologists upon this subject. There does not, however, appear on record any indubitable case or history in which hydrophobia seemed to be communicated from one herbivorous animal to another; but this does not weaken the analogy to virulent poisons observed in the hydrophobic bite of the other two classes. Again, the effects of the bite, like those of a morbid virus, for the most part, manifest themselves within a certain time after its infliction, by far the greater number becoming ill between the thirtieth and the sixtieth day, and a great majority of these again about the fortieth, the day before, or the day after. Every morbid virus, however, presents irregularities in the time of its manifestation, and that which remains the longest latent, by affording time for the occurrence of a greater number of causes for its evolution, must be that which presents the greatest number. Hence it is, that the syphilitic and hydrophobic virus exceed all others, and nearly coincide between themselves, in this irregularity. Nay, the fact that dogs frequently communicate the disease by a bite during this latent period, seems to evince that there is a

morbid assimilation in progress long before the appearance of the symptoms; a circumstance which is perfectly in accordance with the idea of a virus; but which cannot well be understood on any other supposition. The train of symptoms occurring in the wound itself, which we have ventured to comprehend under the term recrudescence, correspond very well with the idea of a virus. Why should the wound, after a considerable lapse of time, again become painful, red, and swollen, unless some cause of irritation still remains lurking within it? Why should it re-open after such an *increased* action, of which augmented adhesion is understood to be the only natural result? Wounds re-open in scurvy, purpura, pest, and putrid fevers, because the weakened vessels easily part from each other at their points of inoculation; and cannot, moreover, deposit new matter in proportion to the rapidity with which the recent texture, now almost dead matter, is taken up by the absorbents, and the bond of union is thus first destroyed by the absorbents from within; just as it would certainly be the first to yield to the action of escharotics from without. But the state of the parts seems totally different here; and that they are ultimately separated from each other by the irritation of some matter lodged within the place of the wound, seems proved by the peculiar nature of the ichor discharged, by the eruption which sometimes takes place around the cicatrix at the same period, and by the livid colour frequently observed to surround it. The latter, it is believed, owes its frequent appearance about specific sores to their acrid matter inflaming and contracting the valves of the contiguous veins, by which it is absorbed into the system. Thus, though we cannot give ocular demonstration of hydrophobic any more than of any other virus, its existence rests exactly on the same foundation as that of all others. This virus cannot proceed immediately from the teeth, for their flinty sheath of enamel remains unchanged during the whole disease, and they present no pores, canals, or openings through which the noxious matter may distil, no poison bag as in the fang of the serpent. The saliva, therefore, is the immediate vehicle of the poison; but it does not follow from hence that the salivary glands themselves are its primitive source. Troiliet contends that the virus proceeds from the bronchial membrane of the lungs, which is in a state of inflammation. The tonsils too are known to secrete a matter very different from the ordinary appearance of saliva; and anatomy in many cases detects a very fetid product in the follicles of the arytenoid glands of the larynx, which is believed to be the cause of offensive breath during life; and the breath of hydrophobic patients is often observed to be extremely disagreeable. The lungs are in a state of morbid action during a great part of the disease, and the effects of the impingement of acrid halitus from these organs upon the membrane of the fauces become very manifest in certain cases, as in the symptomatic aphthæ of phthisis pulmonalis,

and the blistered chops which frequently precede mercurial salivation. The virus, then, may either be an addition to the saliva, analogous to that of oxalic acid, which Brugnatelli discovered in it, or it may be the whole saliva morbidly changed; and, at present, in a state of animal chemistry that cannot distinguish between the bland mucilage of gum arabic and the most virulent poison of serpents, the decision of this question cannot be of much importance.

"Is the virus absorbed into the system, or does it remain in the wound?" We have above observed, that if the hydrophobic virus is absorbed, it does not specially affect to find its way into the body through the medium of the lymphatic system; it may enter the circulation still more rapidly however by means of the veins; and the lividity described about the cicatrix at the commencement of the disease seems to point out this as its actual course. To those who suggest that the poison may remain confined to the part, and thence impart, from its malignant focus, a portion of virus to the blood as it circulates through it, till the whole is imbued, it may be answered that, though the suggestion is possible, we know of no fact, and see no analogy in its favour; whilst, on the other hand, it is matter of familiar observation that all other poisons, under the same circumstances, are rapidly absorbed, and may in many instances be prevented from producing their specific effects by mechanical impediments interposed in the course of absorption. This last analogy is also fatal to the ingenious suggestion that the poison may remain in the part, and by nervous sympathy, or, in other words, by irritation communicated from thence along the nervous system, may dispose that system to produce all the morbid phenomena which constitute the disease, and the vitiated poisonous secretion among the rest: just as we perceive in hysteria, proceeding from the topical irritation of worms, or in the non-rabid species of hydrophobia. In short, a virulent specific poison inserted into a wound, and producing, by absorption, convulsions, fear, contagious secretions, and death, is not only an ordinary, but an almost universal event; but a poison of the same character that should lurk in a small corner of the patient's flesh, obstinately resisting all the powers of absorption for months, and finally, without departing from thence, create a malignant poison capable of reproducing itself through thousands of living beings in succession, would be a fact entirely unprecedented; and as it has not been proved to have happened, is therefore at present only a supposition extremely improbable. There remains, therefore, no just or tenable ground for believing that the hydrophobic virus enters the system in any other way than through the ordinary course of venous absorption. To the questions arising from this admission, we can only attend with propriety when considering the *proximate* cause or *theory* of the disease.

The dog and cat, and animals closely allied to them by natural characters, have alone been proved, by correct observation, to possess the

power of communicating this disease. The fox and the wolf are the kindred of the dog; and these, with the latter and the domestic cat, are all the animals which appear upon credible testimony to have produced a genuine rabid hydrophobia by their bite. From all the examples of which the history can be believed at present, it does not appear that age, sex, or variety of breed, or other corporeal circumstances, exert any influence with regard to the disease in these animals. It is true that in Mr. Gillman's account of the death of a sow and her two pigs, all bitten at one time by the same mad dog, whose disease on dissection he fully ascertained, age seemed to have some effect. The pigs were seized respectively on the tenth and fourteenth days after the bite, and the latter died three days after; while the sow was not affected till the twenty-seventh day, and struggled with the disease for five days before she expired: but there are other cases directly the reverse of this result. Indeed the external circumstances which are generally supposed to favour or actually to cause its production in those creatures, are far from being unscrupulously admitted by medical writers. Hunger, putrid food, confinement, violent treatment, great atmospheric heat, great cold, suppressed salacity, checked perspiration, the growth of a peculiar hydatid or worm under the tongue, intestinal worms, epidemic contagion, want of water, self-generated contagion, have all been assigned as causes of the appearance of hydrophobia among animals. With regard to hunger, it is known that the pangs of this state induce a high degree of fury in the wolf, but this recedes when his famine is allayed. It is not hydrophobia, and it does not even appear that the dog, whether domestic or wild, even when dying of hunger, exhibits the same fury. Finally, by far the greater number of cases occur in dogs and cats that are highly fed and pampered. Putrid food seems an aliment as natural to the dog as to the vulture or maggot. The greater number of dogs are lured to it from afar by the odour, and feed upon it with delight. The great majority of dogs kept in kennels are fed upon nothing else; and if we except a chance of the disease running through a kennel when once it occurs, hydrophobia is not very frequent among dogs so preserved. Add to this, that many tribes of mankind, as the sturdy natives of Kamschatka, who abhor all food that has not been some time putrid, are yet far more healthy than others on the same parallel, as the Esquimaux, who eat their victuals fresh; and the undeniable fact that favourite lap dogs and favourite cats, whose taste has long been rendered too nice by indulgence to eat putrid meat of any description, do yet very frequently become mad, and communicate by their bite hydrophobia to man, and rabies to other animals. Great abundance of carrion, however, by congregating a number of dogs from all quarters, whether healthy or infected, must greatly tend to disseminate the malady. The same must be the result of confinement, where many dogs are

kept within the same kennel; and there is very competent authority that the bites of a rabid animal thus enclosed amongst others, may often be traced through a great part of their number, although they are not all seized with the disease, and experience has not proved that confinement usually becomes the exciting cause. It sometimes happens, that dogs suspected of hydrophobia undergo very cruel treatment, but this is more frequently after than before they have manifested that irritability, snappishness, or fury, which are generally deemed characteristic of the disease. By far the greatest number, however, of those affected have suffered no violence from man, and it seems much more probable that in almost every instance they derive the fatal poison from infection communicated by the bite of another dog already diseased.

The most common notion respecting the origin of hydrophobia in these animals is, that it is excited by great atmospheric heat, as for example by that of the dog-days; and hence the annual panic in our own and most other countries, the tying up, muzzling, and killing of dogs, and many other sanitary regulations of police during the hot season. That absolute heat will not of itself determine the appearance of hydrophobia among animals has been already established, from the rare occurrence of the disease in tropical countries. Still there is no reason why autumnal heats should not increase the frequency of the disease in more temperate regions; and the consonance of general opinion with the notions of most writers seems to favour the idea. M. Trollet found the dates at which 114 different dogs had become affected with the disease to spread themselves throughout the whole circle of the year; but the most considerable of them were comprehended in the months of May and September; on the contrary, they were fewest in January and March. The dog loves heat, and delights to saunter about or lie half asleep upon the ground out of doors in warm weather. Hence many more strange dogs are brought into contact with each other, and the chances of infection multiplied; while the excitement produced by the heat may perhaps render them less cautious than ordinary of meeting each other. In point of fact, however, a general register of cases is said to exhibit the disease occurring pretty uniformly through every range of temperature, and every season of the year. Hildenbrand and Roserus conceived that the extreme excitement which in this animal prompts the venereal appetite, disturbs the nervous system so much as to induce a degeneration of the saliva, a change which takes place easily, because the dog never sweats, and consequently the fluids are carried towards the mouth in much greater quantity in this than in other animals. This notion has received some support on the continent,* but it is not easy to see how a state of excitement, which is common to all animals, should produce a specific af-

fection in so few species, and in these again only in a very few individuals; for by far the greater number of animals become mad by having been bitten by other animals. We had supposed, indeed, that the idea of spontaneous hydrophobia had been long since exploded, for the simple and obvious reason that it cannot be proved ever to take place; for we have not yet ascertained all the circumstances under which hydrophobia may be communicated in animals, nor how long the disease may be dormant in their system. So that we should never be safe in asserting that any case was spontaneous, or had arisen without any external cause. Moreover, it is still strongly disputed, whether, from simple irritations within our system, contagious disease can in any case be propagated. Without examples and without established theory, therefore, the notion of the spontaneous origin of hydrophobia, originating at times in the same manner as typhus is supposed to do, from some internal actions, must, like the origin of all epidemics, be referred to the obscure chapter of medical hypothesis which treats of the general origin of diseases. With regard to want of water, no such privation is suffered by a vast majority of the animals from which the disease seems to proceed; and as to the worm under the tongue, it is an anatomical delusion.

We have already alluded to the false, though very general conclusion, that hydrophobia, because it always originates from the same cause, ought always to manifest the same symptoms in whatsoever species of animal, or whatever individual of these species it may occur. Every day's experience refutes this fallacy. The precepts of the Baconian philosophy of induction now triumph over the ancient, *a priori*, method of conjecture in every question of science; and in the present disease, by enforcing the results of strict observation, have banished from the histories in which it is recorded those imaginary analogies by which, however specious, they were formerly defaced. But the variations of symptoms brought into view by this improved mode of investigation are so numerous and discordant, that the causes of these discrepancies between the forms of the disease as it occurs in different species and different individuals become a fair and legitimate object of inquiry. First then, it must be observed, that in the appearance of the symptoms some modification may be expected from the degree of sagacity or intellect of the animal affected. Man, who is distinguished over all other creatures by the superiority of his reasoning faculties, and by the power of correcting morbid associations by the employment of these faculties, may be well supposed to resist the establishment of many diseased combinations of ideas, originating in the perverted sensations peculiar to this malady, which would instantly have undisputed possession of a quadruped. And thus also in man himself, with adults, so long as there is no delirium there is little or no fear of water, or of circumstances suggesting the recollection of water; but when the delirium

* Sprengel. VI.

is once become high, the person no longer suffers merely from the pangs endured from attempting to drink, but associates in his mind those tortures with the fluids which produce them or matters that resemble them. On the other hand, infants, weak-minded persons, young and stupid animals, seem to yield to this very natural association, and further to combine it with self-preservation almost from the commencement of the hydrophobic attack. On the same principle, it is hardly to be supposed that a carefully educated and sagacious dog will so readily yield to the suggestions of these morbid feelings, or so soon resort to the means of self-defence which in brutes are inseparably combined with attempts to destroy the object of their fears, as would a wild and masterless animal; and this is probably the reason of that indiscriminate fury observed in the mad wolf, now believed by naturalists to be merely the dog run wild, as it probably is the cause why hydrophobia is so often communicated by dogs of which no one knows the owner. Hence it is that wild dogs in this state fly at all things in their way and tear them with violence, while the fully domesticated dog, unless highly provoked, rather snaps than tears. In a most formidable experiment performed on a little favourite dog, in the year 1826, Mr. White, of Brighton, found it no easy matter to induce the animal to bite his arm, although it was so far advanced in the hydrophobia as to die in a day or two afterwards. This may also afford an explanation why many dogs lap water, and even swallow it for a considerable part of the disease; whilst others seem to be completely deterred from it by the great pain it occasions. Thus the sow and pigs described by Gillman, would not swallow fluids, but showed no aversion to the sight of water, although the sow, in addition to the extreme irritability of surface which they all manifested, became subject to that panaphoby, or universal alarm, in which many of the ancients believed the essence of hydrophobia to consist; the older animal thus having sagacity to form an association between pain and consequently danger, and the contact, sound, or approach of external agents which produce them; while the younger ones did not seem to form the same combination. Besides the influence of sagacity upon the mode of avoiding pain and danger, something may also depend on the physical structure of the throat: the pharyngeal spasm does not always constitute the whole difficulty of swallowing; there is very frequently joined to it a feeling of immediate suffocation, and a terrible oppression of the whole respiratory functions, somewhat resembling the worst forms of asthma. When these are wanting, the patient may be more easily enabled to overcome the spasms of the pharyngeal muscles; when they are present, he will be deprived of this power. Finally, this effect may be considerably modified by the force and direction with which the pharyngeal spasm happens to bear on the opening of the larynx; and all the results may be greatly modified by the state of augmented sensibility,

or by the absolute inflammation, perhaps, which exists in those parts.

Having premised these sources of variety, we shall briefly state the symptoms which generally appear in the dog; and which are, after all, abundantly akin to the symptoms of human hydrophobia: but as a great deal of error, and certainly little benefit has hitherto been derived from their study, we shall, in a dictionary of human diseases, consider ourselves entitled to treat the malady of the dog with great brevity, and to pass over that of the other animals in perfect silence. Sometime before the hydrophobia makes its actual appearance in the dog, he exhibits some singular departure from his ordinary habits, such as picking straws, threads, or small bits of paper, from the floor; licking the noses, &c. of dogs, or other animals with which he is domesticated; becoming suddenly attached to animals formerly regarded with indifference; licking cold surfaces, as cold stones, or cold iron. He is observed to be shy, lonely, and irritable, he avoids the approach of other dogs, and sometimes of man, and appears to be less eager for his food, or altogether to neglect it; his ears and tail frequently droop, his look is suspicious and haggard, and sometimes from the very commencement there is a slight redness and watering of the eyes. In a short time saliva begins to flow from his mouth, and passes by degrees into a viscid foam. Respiration is difficult, and performed with panting; the tongue hangs out of his mouth. At this period inspection of the fauces often shows them to be red and inflamed. He has fever, the skin is sensible to the touch, but he still obeys the voice of his master, though now easily provoked to snap at other objects. In many dogs the signs of fury never rise higher than this; but in all there is a repugnancy to control, and a readiness to be roused to extreme rage on the appearance of a stick, whip, or other instrument of punishment; and all attempts at intimidation only serve to increase their rage. Nevertheless, indiscriminate aggression, and unprovoked fury are occasionally to be observed determining all the motions of the rabid dog; he flies at every creature he meets, bites all the dogs, and gnaws the wood of his kennel; and when admitted into a field where sheep, goats, cattle, hogs, geese, or other timid unoffending animals are collected, he tears and pursues every individual of the flock he can approach. The cat is an early object of his rage, and even the horse and elephant have not unfrequently sunk under its baneful effects. Vomiting frequently precedes or accompanies the disease, the respiration appears laborious, tremors are frequent, and the animal is at length destroyed apparently by convulsions. Inspection of the dead body exhibits, with the same irregularity, phenomena entirely similar to those detected in the bodies of the victims of human hydrophobia. It is generally believed that the latent period is shorter in dogs, and indeed in most animals, than what it appears to be in man, but this point is not very well ascertained, and there is abundance of evidence

of the poison having remained in the dog for several months before the disease was produced. Nay, it seems pretty certain that he has frequently communicated hydrophobia to man and other animals, during this apparently latent period; a circumstance which shows that the virulent assimilation is even then going on in the animal's fluids; and suggests great caution in our intercourse with these creatures.

Many have asserted, from Aurelianus downwards, that dogs occasionally communicate hydrophobia to man, to their own species, and to other animals, by their exhalation and saliva alone, without inflicting a bite. To inspire the visible vapour they exhale, to receive their saliva upon the skin or into the mouth, even to be scratched by their nails, or by the nails of a cat, has been supposed to be sufficient to induce the disease. There are certainly a few cases related of hydrophobic patients which seem to come under this description; but as has been well observed by Dr. Bardsley, it is much more probable that, in such cases, some small portion of the cuticle had been deficient at the part with which the saliva came in contact, and thus afforded all the facility of a wound to the conveyance of its poison into the system. The ancients were well aware of the possibility of this, for Celsus observes that the integrity of the lining membrane of the mouth is necessary to the operations of the *Psylli*; and Dioscorides expressly orders those who were to suck out the poison of a rabid dog, first to wash their mouth with astringent wine, and afterwards to lubricate the cavity with oil. With regard to dogs, Mr. Meynell observes, that such of them as have been thought to become affected merely by the contagion of the same kennel, will generally be found, upon minute examination, to exhibit the marks of bites, although concealed by the hair from ordinary observation. With regard to the effects of a scratch, these resolve themselves into the great probability of part of the saliva of the rabid animal having been introduced by the claw which produced it, or having afterwards fallen upon the open wound. In fact, both dogs and cats do very frequently present their foot to the head or mouth, when affected by any uneasiness in that quarter; and they frequently rest themselves with their head reclining upon the fore paws. All such cases, however, are comparatively rare, and there is reason to suspect that many of these histories were examples of non-rabid hydrophobia. From what we know of the great absorbing powers of the lining membrane of the stomach and lungs, it seems not improbable that the poison, if introduced into the saliva, as by kissing a rabid animal, by admitting pieces of cloth, leather, sticks, and the like, impregnated with the same saliva by its bite, into the mouth, the venom might find its way to the stomach and even to the trachea and lungs, and thence, by absorption, be received into the system; and there are some very positive testimonies on this head extant among the older authors; but nothing satisfactory of the kind has been observed during the last two centu-

ries; and we feel ourselves compelled to pause before we admit the inference. The same caution must be observed with regard to the many animals, in addition to those above mentioned, which have been named by medical writers as the propagators or victims of hydrophobia. The camel is alluded to by Aristotle; the leopard, the bear, the horse, the ass, and the game-cock, are mentioned by Aurelian, as animals propagating the disease; Penada (*Saggio*, &c. 1793,) has recorded a case of hydrophobia resulting from the bite of an insect; and the lion and tiger are vulgarly believed to be capable of producing the same effects. Later investigations seem to show that the herbivorous animals do not easily communicate the disease; but the whole evidence adduced is jejune and meagre, and the paucity of cases of communication may entirely result from the pacific disposition of such animals. It is the nature of the carnivorous to be easily roused to rage, combat, and violence. The author of nature has made them so, because by combat and violence he hath destined them to support their existence; but the pacific races that crop the flowery mead, and participate, without resistance, in the bounteous repast with which they are every where presented, have neither habits nor motives which febrile or nervous irritation might prompt into violent action: and into them the same great author has instilled fear only as a motive of flight, seldom as a motive of aggression or resistance. Hence probably, the extreme paucity of their bites altogether, and the assertion that they never reproduce the disease; an assertion which we look upon as calculated to diminish circumspection, and to inspire more confidence than is warranted by the evidence upon which it is founded: we wish that in hydrophobia no other conclusions had been originally drawn from such slender premises, and afterwards expanded into general laws.

It would be of much importance to ascertain, out of a given number of persons bitten, the actual proportion that become affected with hydrophobia. It is difficult, however, to come at any thing like distinct truth upon this point apparently so obvious; for the dog is either immediately killed or tied up, and, consequently bites only a small number, or he runs wild in the country, so that the number of his victims cannot be ascertained. Mr. J. Hunter, however, asserts that he knew an instance in which, of twenty-one persons bitten, only one became affected with hydrophobia; Dr. Hamilton seems to think that one out of twenty-five becomes affected. In 1780, a mad dog in the neighbourhood of Senlis took his course within a narrow circle, when he was killed, after having bitten fifteen persons, of whom three afterwards died of hydrophobia. The French government ordered the most eminent physicians to resort to the spot, examine the cases judicially, place the patients in hospitals, &c. so though the original number is too small to warrant a strong inference, yet it presents the proportion of the number bitten to the number ultimately

infected in one instance with exactness. At Brive, a wolf bit seventeen persons, and of these ten died hydrophobic.

The causes which are said to produce the non-rabid form of hydrophobia, having no great connexion with each other, and being incapable of inducing a successive propagation of the disease either to animals of the same or of a different species, they cannot be supposed, as yet, to have all come to our knowledge:—

1. Superficial wounds, particularly of naked and prominent parts.
2. Nervous irritation of various kinds.
3. Violent intermittent fever.
4. Injuries of the brain and spinal chord.
5. Morbid conditions of the stomach.

The symptoms of the disease induced by these causes do not differ materially from those which result from rabid hydrophobia, and we therefore supersede the unprofitable labour of repeating a detail of these indications. Whoever wishes to consider them minutely will find the particulars of many cases, at great length, in the article *Hydrophobie* of the *Dictionnaire des Sciences Médicales*, and the same condensed, we may be allowed to say, not with great skill, in the *Dictionnaire de Médecine*. Perhaps the best case of the kind on record is that of Lindsay, which occurred from hunger, excessive labour, and mental anxiety, and has been described with great care by Dr. S. Bardsley in his valuable *Inquiry into the Origin of Canine Madness*. It may be remarked that Lindsay must have long laboured under hypochondriasis; for a man that could remain, as he relates, from 1782 to 1794, in the constant dread of his family dying of hunger, without having once suffered it in all the twelve years that intervened, either wanted the usual powers of generalization common to other men, or was no stranger to the disease characterised by a *metus mortis a causis non æquis*. Lastly, the symptomatic forms of hydrophobia must, in a great measure, be referred to their nosological arrangement given above. We do not hold ourselves answerable for a disease, more or less than appears there, having exhibited symptoms of hydrophobia. Observation cannot yet be complete in this respect; and it is certain that our means of judging of the veracity and discrimination of writers describing such cases are very far from being in that state. They are quite unimportant as regards idiopathic hydrophobia; because hitherto no connexion has been established between them; and it is seldom that the disease in which symptomatic hydrophobia originates is better understood than hydrophobia itself. It follows that the only proper place for the consideration of such anomalous symptoms is under the disease in which they arise.

The proximate cause or theory of hydrophobia demands particular attention. Empirical trials, of which the practitioner often thinks but too highly, confounding what succeeds with the ordinary progress of nature, powerfully modified by external circumstances, have held out no flattering unction to human vanity here. Every thing has been tried, and every thing

has failed. And unless reason shall discover so much of the theory of hydrophobia as enables us to resist the evil or counteract its commencement, the malady must be given up as incurable; as one certainly for which there is no longer any hope from experiment. It will not be much to the profit of the reader, however, to record every extravagance which may have escaped the profession during two thousand years of ceaseless speculation upon this topic. We shall, therefore, content ourselves with chronicling a few of the most remarkable opinions that have come down to our own times, several of which have been adopted by different sects in the medical world.

Democritus	B.C.	400
Gaius, brain and motor nerves, 8th pair		200
Asclepiades, stomach		105
Artorius, stomach		30
Themison, thirst and strictum.....		30
Artemidorus, in the stomach		30
Dioscorides		30
Celsus		18
Aurelianus, deficient moisture	A.C.	230
Galen		230
Mead, fermentation of nervous fluid producing fever		1720
Dessault, worms		1738
Rush, malignant fever		1798
Bosquillon, imagination		1809
Dr. Read, spinal marrow		1819

Having already shown, beyond all rational contradiction, that hydrophobia is certainly the result of a morbid poison introduced into the system of the animal which it affects, the *modus operandi* of the exciting cause, according to these various hypotheses, becomes much circumscribed. For example, if, with Mead and Rush, we consider hydrophobia as a fever, then must the inoculated virus be allowed to produce it after the manner in which the exanthematous viruses produce their respective febrile eruptions, or the different miasms, when inhaled, engender fevers. Of course we can make no allowance for Dr. Mead's perversion of the nervous fluid, as it is no longer believed to exist. But there is no more difficulty in comprehending how the rabious poison may produce its peculiar fever and spasms, than why the poison of small-pox produces a severe fever, often with convulsions and vomiting, and a severe inflammation of the muco-cutaneous membrane; or why the infection of pertussis produces a fever with peculiar spasmodic coughing, and a copious discharge from the mouth and fauces. Nor is there any more difficulty in comprehending these latter effects, than in conceiving why croton oil, introduced into the circulation by abrasion or puncture, excites violent action in the bowels; tartar emetic in the stomach; and squill in the kidneys. They are the simple result of that original quantity of irritability wherewith these parts have been furnished, and by which alone they become susceptible of the

influence of the given irritant applied in a certain dose.

Diversity of property, whether of organic or inorganic structures, is the great beauty of creation, and constitutes the essence of individual natures, or that character by which they are distinguished from every other thing, and are thus solely the things they are. It is the principle medium through which its divine architect conserves the actions of the machine, which in this sense, become just so many fulfilments of his original purpose. Such effects of external upon susceptible bodies differ in little from the action of an acid upon an alkali, being equally the result of special properties previously impressed upon each; and are facts not to be explained but observed. The blood of an animal imbued with the canine poison may have its power of irritation exactly in that degree of modification which produces most vehement effects upon the nerves of voluntary motion, and upon the distributions and connexions of the eighth pair; and yet not to be in a state capable of effecting the least impression upon the liver, spleen, kidneys, or uterus: and, on the other hand, the motor and pneumogastric series of the nervous system may be originally endowed with exactly such a degree of susceptibility as enables them to originate those high indications of excitement which they exhibit in hydrophobia, with frequent febrile reaction whenever the virus is applied to them through the medium of the blood. The peculiar effects of every individual virus hitherto discovered, prove that this mutual coaptation of the stimulus and sentient fibre to each other is not merely a vague supposition of what may be, but an actual induction supported by the analogy of every known example of inoculated virus. We repeat then, that this notion of the hydrophobic poison producing great nervous irritation and fever, from which all the other phenomena naturally result, is far from being wild and fanciful; and, independently of the names of its distinguished authors, merits due consideration. It has the advantage of embracing nearly all the phenomena, as it is not necessary that the fever should appear on any particular day, or appear at all, just as we see obtain in tetanus and whooping-cough; neither when it does come, does there seem much excuse for so keen a verbal critic as Dr. Rush terming it *malignant*. The vomiting, gastric pain, appearances on dissection, as well as the peculiar character of the matter ejected, the thirst and spasmodic irritation of the throat, and the necessity of some portion of the acrid saliva being received into the stomach, are circumstances which have induced many distinguished men to believe that the virus first exerts its malignant influence upon the stomach, and from this, as a centre, radiates its action to the most distant points of the system which have any consent with the stomach, by that sympathetic irritation which we see prevailing in so many gastric diseases. This view is also ingenious, and comprehends a great many of the phenomena of hydrophobia; but it appears liable to some fatal objections; it does not explain the total absence of gastric symptoms in

many individuals, and of traces of disease in the tunics of the stomach in many others; and there is frequently no rejection of solid food by hydrophobic patients, or of solids and fluids by dogs, as happens in gastritis, and might be expected to take place if the stomach was in any way the primary seat of hydrophobic irritation. The affection of the respiratory organs also, seems quite too violent to be an effect of mere gastric irritation.

Still less tenable was the ancient hypothesis, that the virus of the mad dog first acted upon the liver, producing a large secretion of black bile: that this black bile accumulating, frequently gave rise to the symptoms of melancholy and hypochondriasis, diseases which were then supposed to be produced by that fluid: that the black bile then made its way into the stomach and excited hydrophobia, very much in the same way we have just sketched. There is no black bile, and the occasional appearance of bile in the stomach is the effect of the vomiting, not the cause. The same series of objections apply to the opinion which refers the principal focus of hydrophobic action to simple inflammation of the pharynx and larynx, or of the two former, or of the latter alone; in all these situations the marks of inflammation are often entirely absent. The sensibility of the fauces, the copiousness of the salivary secretion, the thirst and suffocating spasm, bear no proportion whatever to the presence, absence, or degree of these traces of inflammation which scarcely ever appear at the commencement of the disease, and are therefore consecutive of some other and later part of it. Besides, the general sympathies of the fauces are not very extensive, and they are so ordinarily the seat of inflammation that it would not be rash to assert that no one case out of a million exhibits a regular specimen of hydrophobia, even in its non-rabid form; while scarcely one case in a hundred is without a regular display of them in the rabid form. This consideration mightily reduces the number of chances in favour of the phlegmasian hypothesis which counts many able supporters.

Authors have conjectured that the initial seat of the virus might probably be somewhere in the respiratory apparatus, in the larynx, bronchi, lungs, diaphragm, thoracic muscles, or all of them together. This conception has certainly the advantage of coinciding with appearances at a very early stage of the disease, in which frequent sighing, a panting motion of the chest, uneasy respiration, an occasional sense of suffocation and fainting, are generally experienced: it has the further advantage of explaining what takes place in the pharynx, gullet, and stomach much better than the assuming these symptoms to be primary; and elucidates the perverted state of respiration considered as their consequence. But the theory affords no rational explanation of the fever, the mental aberration, the salivation, the tremors, the spasms; and these objections seem fatal; for no theory of a disease can be admitted which leaves as much as it illustrates unexplained. We have said enough when we mention M. Dessault's

theory of organic worms; of which the day is long past.

It seems hardly necessary to observe, that those ancient authors of the Alexandrian school who ascribed the seat of the disease to the brain and its membranes, merely did so because they considered these organs as the primary origins of the nerves; the nerves of sense being conceived to proceed from the mass of the brain and spinal marrow, while the nerves of motion were believed to spring, by small roots, from the membranes that invest them. This is also the comment of Aurelianus, and we are warranted therefore in affirming that their theory of hydrophobia differed not essentially from that of Mead and Rush, and does not therefore require to be considered apart; since, like these authors, almost all the ancients admitted the absorption of a virus. Themison, Aurelianus, and others of the methodic sect, conceived that the virus inflamed and dried up the blood, thereby producing a deficiency of secretion into the fauces and gullet, great thirst, and a general constricted state of the system. In short it was a well-marked example of the *stricture*, and accordingly directed all their efforts to subdue this state of rigidity by introducing fluids into the colon, plunging the patients into water, and other contrivances. M. Majendie's method of injecting tepid water into the veins might be expected to answer the same purpose; but it is impossible to prove the existence of constriction in hydrophobia; thirst is not always present; and the whole theory has been long since exploded, as incompatible with the doctrine of the circulation and with the general principles of pathology.

Of late years, since the experiments of Legallois, Wilson Philip, and Majendie, respecting the structure, function, and relations of the spinal chord have become so justly celebrated, Dr. Reid of Dublin, and several continental writers have endeavoured to revive a part of the above ancient theory, and to replace the principal seat of hydrophobia in the spinal marrow. Some slight dilatation in the vessels of this part, and vestiges of inflammation noted in one or two dissections, seem to be the only new facts upon which, in connexion with the light thrown upon the spinal portion of the nervous system by those experimentalists, this idea is at present supported. But it leaves the mental phenomena, the salivation, the spasms of the face, the tenderness and unnatural appearance of the skin, the gastric, and particularly the diaphragmatic irritation, altogether unexplained; for it is scarcely necessary to observe that the nerves of the stomach and diaphragm originate much above the points where such congestions are observed; and which, though they be often totally absent, are not therefore to be totally denied, since both men and animals (Gillman's pigs for example) often exhibit a distinct paraplegia some time before death. It is not improbable that the paraplegia here alluded to in man is that which has given rise to the numerous fables of the older authors, of hydrophobic patients rolling themselves up like a ball, crawling on all-fours, and attempting to

lap water in the horizontal posture, like a dog, &c. "In a state of despondency," says Dr. White, of Bury St. Edmunds, "and with agonising groans, the patient threw himself down, as we thought, in a corner of the room, and soon after crawled about in a restless manner, dragging his legs after him, which proved to us that he fell on the floor from his lower limbs being palsied."

Amidst so many ingenious hypotheses, if we are finally asked which of the number appears to us to be on the whole the most consonant to reason, we at present say that an explanation of the phenomena which does little violence to the recognized principles of pathology may most easily be drawn from the first, which assumes that the imbibed virus, like most other poisons, mainly and initiatively spends its force upon the nervous system. It is a well-known fact that all severe injuries inflicted upon this system, whether in the way of stimulus or depression, manifest the gravity of their influence most remarkably in that series of organs supplied by the eighth pair: and conversely, experimentalists, as M. Desmoulins, have found that the smallest pressure even of a drop of blood upon the origin of this nerve in animals almost instantly extinguishes life. The affection, then, so strongly marked, of the parts supplied by this nerve in hydrophobia, and the curious circumstance of its never extending its ravages below its pneumo-gastric termination, may perhaps be considered merely as an index of the deadly virulence of the cause. Still we have shown above that there is no difficulty in comprehending, with the ancient Gaius, that the poison of rabies exerts a peculiar inveteracy of action upon the origin of the respiratory column and the commencement of the eighth pair, just as the vomiting, dysphagia, and laborious respiration, occurring from a violent blow on the head, may either be assumed as the known ultimate effect of general compression, or as a modification of these by some special injury at the same time inflicted on the origin of the same pair.

Diagnosis.—Properly speaking, there is scarcely any disease that a careful practitioner would confound with hydrophobia; but in cases where no rabid impregnation is suspected, the disease may be mistaken for phrenitis, mania, fever, or tetanus; and, in the incipient stages, for melancholy, hypochondriasis, and hysteria. It can only be mistaken for any one of the three latter during a few hours from the commencement. Hysteria and hypochondriasis advance by slow degrees, and rarely have fever, difficulty of respiration, tenderness of skin, or salivation. Melancholy is altogether a chronic disease, and never has convulsions, spasms of the throat, dread of water, difficult respiration, and vomiting among its symptoms. It is true that phrenitis, and what was long classed as a form of it, delirium tremens, have tremors, suspicious fears, tenderness of skin, convulsions and difficult swallowing; but there is no affection of the stomach or respiratory system, no vomiting, no salivation: nay, spasmodic difficulty of swallowing occurs not in one case out of a hundred.

From mania it is distinguished as soon as the spasms, difficulty of swallowing, and salivation appear. Indeed the mental aberration, the aversion to certain objects, and the fever which is occasionally present in both, seem to be almost the only points of resemblance. Dr. Rush has entered into a long argument in order to evince the identity of fever and hydrophobia; but though hydrophobia has fever, it does not follow that hydrophobia is the same thing as fever; or, in other words, is fever alone. In short, we have often repeated that in many cases of hydrophobia fever actually supervenes; and that where it does occur, it is seldom a primary symptom. The distinction of hydrophobia from tetanus has been made the subject of much discussion. The two diseases seem first to have been compared with each other by Democritus; but it cannot now be known whether he, or indeed any of the ancients, considered the apparently tetanic phenomena of hydrophobia to arise from the wound alone. On the contrary, they seem almost all to have admitted the existence of a virus; and from the earliest periods to have attempted to account for the symptoms by the operation of this poison upon some peculiar series of organs, from the excitement of which they conceived all the visible symptoms to proceed. Democritus traced it to the tendons or muscles; the followers of Herophilus and Erasistratus, the great discoverers of the functions of the nerves, naturally referred the virus to that system; Asclepiades traced it to the stomach; the methodists to their favourite *strictum*, &c. But none who admitted the reality of the disease appear to have disputed the existence of the virus.

Dr. Mease, of Philadelphia, in 1793, published an able work on hydrophobia, in which he contended for the uncertainty of the virus, and makes out hydrophobia to be purely a nervous affection. Charles Bader, in a dissertation on hydrophobia, published 1792, maintains that there is much less of contagious character in hydrophobia than is generally believed, and draws a formal parallel between tetanus and hydrophobia. The non-rabid form of hydrophobia is occasionally symptomatic of tetanus; and both tetanus and hydrophobia seem to originate most readily from a small punctured or lacerated wound. Both exhibit paroxysms of universal convulsion, and occasionally fever, and both carry off a great majority of patients before the sixth day. These are the chief circumstances in which the two diseases agree; and to appeal to more minute but very uncertain points of correspondence, as has been done by the writers who contend with such zeal for their identity, would add nothing to the justness of the comparison. But we have already shown, when discussing the questions respecting the *modus operandi* of the cause of hydrophobia, that there intervene many undeniable discrepancies between the two diseases; and to these many others must be added. Tetanus, as its name implies, consists essentially in a *tonic* spasm, generally

occupying the muscles of the lower jaw, of the neck, of the spine, and the limbs; of the thorax, abdomen, and diaphragm; and always observed more to affect the extensors than the flexors. These contractions of the muscles are occasionally relieved by intervals of ease, but never by entire relaxation; nay, in successful cases, Dr. Currie assures us the deep indentations made in the face by the terrible contractions of its muscles are visible afterwards for many years, and imprint on the countenance a severer character than it previously possessed. A stiff immovable state of the lower jaw, scarcely to be overcome by any ordinary force, is present during almost the whole of nearly every case of tetanus, and has acquired, for that variety of the disease in which the muscles of the spine are little extended, the name of *trismus*, or lock-jaw. On the contrary, the spasms of hydrophobia are always *clonic*, that is to say, they are always of brief duration, and are succeeded by a period of complete relaxation, generally of many hours' duration in the beginning of the disease, unless provoked by attempts to make the patient swallow; and even at the last fatal paroxysm, tonic spasm, and particularly locked jaw, are very seldom to be observed. A discharge of saliva is an exceedingly rare occurrence in tetanus; in hydrophobia it is a general and characteristic symptom. Thirst is rare in tetanus; it is characteristic of hydrophobia. Vomiting and gastric pain or uneasiness scarcely ever occur in tetanus; they are so general in hydrophobia as to be mistaken by many for the essential circumstances of the disease. It is only in rare forms of tetanus that attempts to drink bring on guttural spasm, a dread of fluids, and their violent rejection when introduced; but in hydrophobia this is the pathognomonic triad which fixes the character of every case, with a very few unimportant exceptions. In tetanus, the mind is almost always clear to the last; in hydrophobia, almost from the beginning, numberless deviations from the usual habits of thought and action indicate an incipient stage of mental aberration, which often passes on to delirium or raging madness. In tetanus, fever is rarely present; in hydrophobia, it is frequently present. From tetanus, many recover; from hydrophobia, none recover. Tetanus takes its rise from cold or from any sort of wound; hydrophobia from the bite of a rabid animal. Tetanus, though the usual result of small punctured and lacerated wounds, rarely follows from the bite of a rabid animal; hydrophobia with much greater frequency in proportion to the number of persons bitten, it is said so much as one out of every twenty-five. Tetanus seems more frequent in warm climates; hydrophobia in cold climates, or at least indifferently. Tetanus seems to occur almost any time after the injury; hydrophobia chiefly from the thirtieth to the sixtieth day. It has never been contended that the bite of a tetanic animal communicates tetanus; but it is acknowledged that the bite of a hydrophobic animal communicates hydrophobia. The countenance of a tetanic patient bears no resemblance to the

physiognomy of hydrophobia: in the former, the eye is natural, and the general aspect is that of suffering; in the latter, the eye is preternaturally bright and glistening, the face occasionally exhibiting frightful convulsions, and the pain of the diaphragm is not characterized by a constant sense of the sternum being dragged towards the spine, as is the case in tetanus; while tetanus, on the other hand, scarcely ever exhibits that laborious panting respiration, that tremor of the whole muscles, and that intolerant sensibility of the surface and of the organs of sense, which distinguish hydrophobia. Indeed it is perhaps only by reasoning upon the uncommon as if it were the ordinary case that any person, although exposed to the illusion of his own ideas in the retirement of his closet, could mistake the one disease for the other.

Morbid anatomy.—Whoever peruses with care and attention the various dissections of hydrophobic patients which have at different times been published, will be obliged, however reluctantly, to admit that the pathology of rabies canina is still involved in considerable obscurity, and that no distinctive pathological character of the disease has as yet been satisfactorily determined. The brain has been examined with much care and attention. In some instances the dura mater has been found to have assumed a darker hue than usual. The capillaries of the tunica arachnoidea and pia mater have also been met with minutely injected with blood. This state of these membranes occurred in the dissection of a case published by Dr. Marshall, as well as in several others on record. Trollet has noticed the gorged condition and dark colour of the plexus choroides. Effusion of serum has been observed between the dura mater and tunica arachnoidea; between the latter membrane and the pia mater; between the pia mater and brain; and also in the ventricles. The substance of the brain itself has been detected in a harder state than natural in one or two instances; in others, it has been found to have undergone a certain degree of "*ramolissement*." Both Bonetus and Lieutaud, however, have alluded to cases in which this organ presented no marks of disease.

Inflammation of the *pharynx* and *œsophagus* has been noticed in several dissections of hydrophobic patients; but cases are on record in which no inflammatory appearance in these parts has been observed. On examination of a patient of Dr. Rutherford's, who died of rabies canina, Dr. Monro was unable to detect any morbid alteration, either in the pharynx, œsophagus, larynx, stomach, or intestines. In one instance it will be shown that we have met with an abrasion of the internal membrane of the œsophagus. In a fatal case of this disease, too, related by Dr. Ferriar, a morbid appearance presented itself in the lower part of the œsophagus. About two inches above the cardia, the epidermis of the œsophagus was abraded in irregular points, and exposed an inflamed surface of a dark red colour; still lower, the abrasion became linear and extended into

the stomach itself. The edges of the epidermis surrounding the abrasions were unequal and elevated. A similar affection was traced along the lesser curvature of the stomach, but growing fainter in its progress to the pylorus, where it was least discernible, and about which it seemed to terminate. The whole of the inflamed parts bore a striated appearance resembling the effect of corrosion, darkest in the œsophagus, and lighter and more indistinct towards the pylorus. In two cases mentioned by Dr. Vaughan no inflammation of the œsophagus appeared on dissection. The *internal coat of the stomach* has been discovered in a highly inflammatory state in not a few instances of rabies; and dark purple-like suffusions have also been observed upon it. This organ has also been found to contain a smaller or greater quantity of coloured matter. It has been supposed that this inflammatory condition of the mucous membrane of the pharynx, œsophagus, and stomach, satisfactorily accounts for the sense of suffocation, extreme thirst, morbid antipathy to liquids, and burning heat along the whole œsophageal tube, mostly experienced by the hydrophobic patient; but it must be recollected that such a state of these parts is by no means constantly present, as is proved from the cases related by Dr. Hamilton and other writers; and hence it is not essential to the existence of the disease. From the examinations of M. Trollet, it appears that the mucous membrane of the *trachea and bronchi* afforded evidence of inflammatory action, and was covered over with a considerable quantity of frothy mucus; and the membranes of the brain, particularly the pia mater, exhibited marks of great vascularity. The frothy matter he supposed to be the product of the inflamed mucous membrane. "*La bave écumeuse des hydrophobes,*" he observes, "*est un produit de la membrane muqueuse enflammée, puisque nous l'avons toujours vue dans les parties des voies aëriennes où cette membrane étoit vivement colorée, et qui étoient le siège de la douleur. Elle est chassée sur les lèvres de l'hydrophobe dans la dernière période de la maladie, comme le mucus altéré dans l'agonie d'une personne affectée de phthisie ou de catarrhe, lorsque la respiration est stertoreuse et laborieuse.*" Lalouette has also noticed this peculiar frothy matter in the trachea and bronchi:—"Une humeur," he remarks, "que l'on peut comparer à une salive écumeuse qui enduit toute l'arrière bouche ainsi que le larynx, le pharynx, la trachée artère, et les grosses divisions des bronches. Elle se trouve en plus ou moins grande quantité chez les différents sujets." That the lining membrane of the trachea and bronchi is sometimes in a state of inflammation cannot be denied, but we are satisfied that Trollet's view of the pathology of rabies is too limited; for it will be found, upon a comparative examination of the number of dissections of hydrophobic persons on record, that the stomach has been more frequently met with in a morbid condition than the trachea, bronchi, or any other part of the body. The *salivary glands* have occasionally been observed

of increased size and vascularity. In some instances there has been inflammation of the pulmonary tissue, but more frequently great venous congestion.

Dr. Ferriar was almost disposed to consider the disease as dependent on obstruction of the pulmonary circulation, but his conjecture has not been supported by subsequent pathological investigation. The *pleura* have been noticed in a thickened and inflamed state; and we meet with fatal cases of hydrophobia in some of the earlier medical records, in which *various derangements of the heart, pericardium, liver, spleen, and mesentery* are described; but it is impossible to peruse these dissections without being convinced that the morbid changes enumerated are merely accidental, and the result of other causes than the virus of rabies. Some pathologists of eminence, amongst whom may be mentioned the names of Salin, Brera, Sanders, and Reid, supposed that they had satisfactorily proved that the symptoms of hydrophobia proceeded from a morbid condition of the *spinal marrow*; but it may be correctly stated that their opinions have not been confirmed by the general experience of the profession. In some examples of this disease, (as in the two which we shall notice,) unequivocal marks of vascularity of the membranes of the spinal chord have been present, but, generally speaking, not the least vestiges of inflammatory action either in the medulla spinalis or its investing tunics have been discovered. In one instance, related by Mr. F. Godrich, the whole chord was considerably inflamed; and opposite the two last cervical and dorsal vertebræ the cellular substance was studded with dark patches of coagulated blood, the theca vertebralis thickened, and the chord in an active state of inflammation. The larynx and pharynx bore not the slightest vestige of disease. We may, however, venture to assert that no such connexion as that of cause and effect exists between an inflammatory state of the spine and the phenomena of hydrophobia; for it is well known that effusion of serum into the theca vertebralis, and other signs of increased vascular action in the spine, have been frequently met with in diseases very different from the one under consideration.

As dissections of hydrophobic patients are by no means frequent, it may be instructive briefly to detail the *chief* morbid appearances detected in *five fatal cases* of this disease which have come under our own observation. In one, where the patient died in seven days from the period of his first experiencing pain in the bitten part, and in fifty-six hours from the commencement of the hydrophobic symptoms, the following morbid alterations were observed:—*Brain*.—Vessels of the dura mater preternaturally distended with blood, the vessels ramifying in a distinct manner. Pia mater somewhat distended, and a larger quantity of blood interposed between the membranes than usual. Left ventricle with the usual quantity of fluid. The substance of the brain of the usual consistence.

When pared off in slices, the surfaces showed numerous brown spots. The vessels of the basis, or cerebellum, were more than usually turgid, and somewhat more of fluid effused than usual. *Pharynx* and *larynx*.—No appearance of inflammation. *Thorax*.—Lungs perfectly sound. Heart flaccid. No coagulum in its cavities; two ounces of fluid within the pericardium. *Œsophagus*.—Upon opening the œsophagus, a substance was found lying closely within the orifice without filling up the cavity. This membrane was nearly the length of the œsophagus; when inflated with the blow-pipe it assumed a tubular appearance. The abrasion of the internal membrane seemed to extend as far as this substance. The external membrane of a deep red colour. The whole internal surface dotted with purple-like suffusions. *Stomach*.—Contents about one pint, the external membrane of a deep red colour. Its inside covered with broad dark purple-like suffusions, especially about the cardiac orifice. The intestines sound; the liver of the usual healthy character; appearance of bladder natural. The same marks of disease usually exist in most cases of hydrophobia after death, with the exception of the remarkable membrane found in the œsophagus of the one now described, which was considered by all present a portion of the internal membrane of the œsophagus. In *another* instance, on opening the head, the sinuses were found gorged with blood, and the vessels of the arachnoid and pia mater exhibited marks of highly increased vascular action. The lateral ventricles contained a small quantity of serous fluid, and the plexus choroides was of a pale colour. The substance of the brain was softer than natural. The vessels of the spinal arachnoid and pia mater were minutely injected. The lungs and the bronchial mucous membrane were perfectly healthy. The heart and its large vessels were also sound. The lining membrane of the pharynx and œsophagus was somewhat redder than usual. The stomach presented some few slight ecchymoses; the intestines were free from disease. In a *third* case in which the body was carefully examined by a very distinguished anatomical teacher, Mr. Turner, there was considerable vascularity of the pia mater, with slight serous effusion in the lateral ventricles. The substance of the brain was of a firm consistence. Strong adhesions existed between the costal and pulmonary pleura in both cavities of the chest. The lungs were in a state of great congestion, and when cut into, a considerable quantity of bloody fluid flowed from their substance. The membrane of the trachea and the larger bronchial ramifications were here and there marked with dark purple-like suffusions, and had assumed throughout a darker hue than usual. On an inspection of the inside of the fauces, pharynx, and œsophagus, a scarlet uniform redness was observable. The heart was sound. The stomach exhibited evident marks of congestion, if not of inflammation. Numerous small dark-coloured spots appeared about the

superior orifice, and might be traced along the larger curvature of the organ. These spots very much resembled the marks of small shot. All the other viscera of the abdomen, with the exception of the liver, which was slightly indurated, afforded no marks of disease. The pia mater tunic of the spine, like that of the brain, was much more vascular than natural. The *fourth* instance was that of a boy, nine years of age, who was bitten by a mad dog about three months previously to the occurrence of the symptoms of the disease. He was under the care of a highly respectable surgeon, Mr. Brownbill, of Salford, to whom we were indebted for an opportunity of attending the inspection. The patient died in sixteen hours after the malady had fairly developed itself. Within the cranium nothing unusual could be detected, except a slight turgescence of the vessels of the pia mater, and rather more distention of the choroid plexus than usual. The fauces, œsophagus, and parts adjacent were in a natural state, but the effects of inflammation were very evident upon the lining membrane of the trachea and the larger bronchial tubes. The lungs were sound, but somewhat distended with blood. The stomach contained a small quantity of brownish fluid, but no diseased appearances were detected in it. The other abdominal viscera exhibited nothing peculiar. The spinal marrow was inspected with much care, but there were no marks of inflammation either in its membranes or substance. In the *fifth* and last case we have witnessed, where death occurred in thirty-four hours after the first unequivocal symptoms of the disease had been present, the following were the appearances on dissection. The brain was in a natural state. The fauces and lower part of the œsophagus afforded slight signs of inflammation; the vessels on the inner coat of the stomach were much more distinctly marked than usual; and a few spots of extravasated blood were observable along the cardiac extremity of the organ. The other abdominal viscera were sound. Nothing unusual presented itself either in the trachea or bronchi. The lungs were somewhat turgid with blood. The spine was free from disease.

All the attention we have been able to pay to the anatomical character of rabies canina leads us to agree with Dr. James Johnson in the following remarks: "That it cannot be denied, but that the most evident indications of inflammatory action attend the symptoms, and distinguish the pathology of hydrophobia; that we have often inflammation of the œsophagus, pharynx, and larynx, and occasionally of the brain and spinal chord; yet it is generally admitted that these appearances are more the consequences than the cause of the disorder, and that although frequently present with, they are by no means essential to the existence of hydrophobic action." That they are not *essential* to the existence of the disease is proved by the fact that, in several cases on record, in which the post mortem examinations

have been made by eminent and experienced pathologists, no morbid appearances have been detected in any organ or tissue of the body. Some of the morbid appearances noticed above are no doubt produced by the violence of the convulsive motions which invariably accompany the disease. Lalouette, an able French writer on rabies, has remarked, "*L'ouverture de plusieurs cadavres de personnes mortes à la suite de la rage, ne m'a présenté aucun phénomène particulier à cette maladie. On ne trouve nulle part aucun signe de phlogose sanguine, ni d'inflammation. Je n'ai observé nulle part aucun signe de dissolution, aucun engorgement ou phlogose humorale; aucune gangrène interne, ni même aucune apparence de disposition à cette diathèse.*"

Treatment of Hydrophobia.—The reader will in all probability be prepared, from a perusal of the preceding account of the *pathology* of hydrophobia, to anticipate the conclusion that in a disease on whose nature anatomical investigation throws such feeble light, the treatment must necessarily be unsettled, and in a great measure conjectural. Dr. Good correctly observed, that the mode of cure in this affection is a field still perfectly open for trial; for, at this moment, we have no specific remedy, nor any plan that can be depended upon, after the disease shows itself. There is, perhaps, no malady to which mankind is liable, that has called forth such a host of remedies for its removal, and alike defied their single and united powers. The long list of the *materia medica* has been ransacked to discover some one article capable of arresting the progress of this disease, but all have hitherto proved inert. It would be absurd to do more than simply name several of the substances to which ignorance and superstition have attached importance in the treatment of hydrophobia. Amongst these may be classed the celebrated pulvis antilyssus, the theriacas, the alysmaplantago, the rhus coriaria, the scutellaria, the genista, the Ormskirk medicine, and the tonquin powder. Each of the above remedies has had the title of a specific attached to it, and enjoyed for a time unmerited reputation. In the consideration of the treatment of hydrophobia, it appears to us proper to notice, first, the *prophylactic measures* which are indicated; and, next, the *means to be employed after the disease has been once developed*.

It is fortunate that the community at large are now more strongly convinced than formerly of the extreme folly as well as danger of resorting to the use of the several vaunted specifics for the prevention of hydrophobia, and thus delaying application to the well informed and regularly educated practitioner on the immediate occurrence of the bite. It cannot be too strongly impressed upon the minds of the public, that not a moment is to be lost in soliciting judicious medical aid after the bite of a rabid animal, for the longer the delay the greater the danger of the virus entering the system and producing the disease. We shall endeavour to point out the prophylactic plan

which seems to afford the surest ground for a proper confidence and security against future mischief. The wound should be well and perseveringly washed from the earliest moment of its infliction. The patient may himself adopt this simple practice until surgical aid be obtained. Dr. Haygarth has suggested that the ablution of the wound may be well effected by directing upon it a continued stream of water from the spout of a tea-kettle, held up at a considerable distance. "If the canine poison," he observes, "infused into a wound were of a peculiar colour, as black, like ink, we should all be aware that plenty of water and patient diligence would effectually wash out the dark dye, but this could not be effected by a slight and superficial ablution." After the bitten part has been well and thoroughly washed, it then becomes a question what further means should be employed to prevent absorption of the virus. Upon this point, it will be found that scarcely any two practitioners are agreed; some giving the preference to *excision*, and others to the *actual* or *potential* cautery. The use of the *actual* cautery has been chiefly recommended by some of the earlier writers, and is a practice but seldom adopted in the present day, though it is by no means destitute of advantage under particular circumstances. The application of caustics *alone* to the wound has been relied upon by some eminent practitioners. Mr. Youatt, who may perhaps justly be considered the first living authority on canine madness, has warmly advocated the use of the caustic. He recommends the nitrate of silver. Troillet prefers the hydrochlorate of antimony. Earle, in his evidence given before a Committee of the House of Commons in 1830, says, that he does not place much reliance on any caustic, except strong nitric acid, for it acts very deeply, whereas "other caustic, for instance, caustic potash, when there is any wound, becomes decomposed by the blood, and does not penetrate to the depth that nitric acid does; and nitric acid forms a dry eschar." Other surgeons, on the contrary, strongly advise the employment of the potassa fusa. Mr. Youatt considers the lunar caustic perfectly manageable, and, when sharpened to a point, as capable of being applied with certainty to every recess and sinuosity of the wound. "The potash and the nitric acid," he observes, "will destroy the substances with which they come in contact, but the combination of the caustic and the animal fibre will be a soft or semi-fluid mass. In this the virus is suspended, and with this it lies upon and remains in intimate contact with the living fibre beneath. Then there is danger of re-inoculation; and it would seem that this fatal process is often accomplished. The eschar formed by the nitrate of silver is hard, dry, and insoluble. If the whole of the wound has been exposed to its action, an insoluble compound of animal fibre and the metallic salt is produced, in which the virus is wrapped up, and from which it cannot be separated. In a short time the dead matter sloughs off, and the virus is thrown

off with it." Mr. Youatt informs us that he has been bitten four times by dogs decidedly rabid, and at each time he freely applied the caustic to the wound; and he has remained free from the complaint. He has also operated on more than four hundred persons of whose disease there could be no question, and has not lost a patient. His experience is opposed to the practice of keeping the wound open for several weeks after the application of the caustic, for he supposes, that if a minute portion of the virus should perchance remain in the wound, by applying stimulating ingredients to the part there is considerable risk of exciting the absorbents to action, and producing that disease which would not otherwise have had existence. "Destroy the part at once by the knife or the caustic," he observes, "and then adopt the mildest means speedily to heal the wound." The testimony of Mr. Youatt in favour of caustic is unquestionably very weighty, and entitled to the utmost consideration; but still the fact cannot be concealed, that in the hands of other practitioners, the results of the use of the caustic have not been equally favourable. In the case of Rowley, noticed by Dr. Hamilton, caustic was very carefully applied to the wound by Mr. John Hunter shortly after the infliction of the bite; still the hydrophobic symptoms appeared, and the youth died. It would not be difficult to multiply the cases of failure after a fair trial of the caustic. Mr. Youatt allows that every surgeon must decide for himself respecting the comparative value of caustic and the knife, but he requests that those who prefer the caustic may be no longer exposed to so much gratuitous abuse. He does not condemn the use of the scalpel, but gives a decided preference to the caustic, and only employs the knife in order fairly to get at the wound. It appears, however, from the facts already before the public, that the general experience of the profession is in favour of an *immediate excision* of the bitten part, as affording the best security from danger. Some practitioners have strongly recommended the conjoint use of excision and the caustic.

We shall now briefly give our opinion of the best and most certain means of preventing the disease. It appears to us that *complete excision* of the bitten parts, when at all practicable, ought to be adopted without a moment's unnecessary delay for the trial of caustic or any other external irritant; for it is but seldom that any bad effects ensue from the bite, when this simple operation is carefully and effectually accomplished, and we really consider the medical man who omits this practice guilty of unpardonable neglect towards the unfortunate being who may be doomed, from his want of energy, to writhe under the agonies of this most horrible malady. Indeed the excision of the wounded part should always be employed even in cases where the animal is only supposed to be rabid; for though some degree of momentary pain may be occasioned by the knife, this is of trifling consequence when compared with the mental tranquillity which must result

from the conviction of a perfect immunity from the disease by the operation. The force of the above remarks will be felt, when it is considered that canine madness is *incurable*, according to the present state of our knowledge; for we are satisfied, from careful and extensive research on the subject, that when the symptoms of this disease have been once fairly developed, notwithstanding the most vigorous and diligent attempts of medical men to remove them, no cure has ever yet been effected, but the unhappy sufferer has had to struggle with torments such as the imagination cannot conceive, and which must be witnessed in order to be believed. This is a melancholy truth for mankind to know. When excision has been neglected on the first infliction of the wound, still we consider it highly proper that it should be performed at even a distant period from the bite; for it seems to be an established fact that the virus of a rabid animal does not, like other morbid poisons, such as small-pox, cow-pox, syphilis, and plague, always produce its effects within a limited time. Dr. Todd Thomson has expressed his opinion that the hydrophobic virus is not regulated by the usual laws of morbid poisons, and on that account he is inclined to believe that it remains in the bitten part, and the individual is safe till the habit becomes predisposed to the action of the poison, so that the part may be advantageously excised in the intervening time. A case is related by Professor Rust where the wound was excised thirty-one days after the bite, and after the hydrophobic symptoms had appeared, and still the patient's life was saved. When the wound is so situated that the whole of the bitten parts cannot be completely removed, then of course we must trust to the application of caustic, to scarification, or the actual cautery. Under these circumstances it is of the highest importance that the caustic be carefully and effectually used, for the safety of the patient in a great measure depends upon the manner in which this operation is in the first instance performed.

In order to ensure the removal of every part with which the dog's teeth may have come in contact, (for the smallest portion left may produce the disease,) it is necessary accurately to ascertain the depth of the wound, and the direction in which the teeth have penetrated. Unless the excision be carried beyond the bite, the operation fails to afford the patient a security from future danger. The surgeon cannot use too much care in removing the bitten part. We are informed that in one case Mr. Hunter removed the parts, as he thought, freely, and there was nothing on the under surface of the piece cut out that led him to suppose that he had not gone beyond the bite. But on examining the surface of the wound, he found a part in the middle which was hollow underneath, which showed he had not gone deep enough, but had left a ridge as it were over part of the passage made by the dog's teeth, and which could only have been discovered by examination after the operation.* Though we

have strongly recommended that the wounded part be cut out whenever it can be done with safety, still we see no objection to the application of caustic afterwards to the excised surface, as affording additional security from the greater probability of every particle of the virus being removed or destroyed. With proper deference to the experience of Mr. Youatt, as given above, respecting the impropriety of keeping the wound in a state of suppuration, we must observe that the facts stated on eminent German authority in favor of the practice seem to be incontrovertible. Dr. Wendt states that from the year 1810 to 1824 one hundred and eighty-four persons bitten by dogs were admitted into the Breslau hospital; of whom half were bitten by dogs absolutely mad, or supposed to be mad, and from the whole two only died. It is true, that besides keeping up a copious discharge from the wound for six weeks or longer, mercury was employed internally so as to induce salivation; still by far the greatest stress was placed on the external treatment. It is also mentioned in a very able review of several German essays on hydrophobia,* that at Zurich "the treatment consists of deep scarifications of the wound, the besmearing it with pulvis lyttæ, the application of a blister to the part, the keeping up a discharge from the wound and the blister during six weeks, and the rubbing-in of mercurial ointment till symptoms of approaching salivation come on; internally belladonna or calomel are given." In the same journal an account is given of the treatment pursued by T. M. Axter, senior surgeon of the large hospital at Vienna; and that of Dr. Hausbrand, district physician at Braunsberg, in cases of bites from animals. During twenty-seven years, Mr. Axter states that not a single old patient was ever brought back to the hospital with hydrophobia. Besides using internally, during three or six successive days, a grain of pulvis lyttæ with six grains of *canc. ocul.* and sugar, he applied externally over the wound a blister, and dressed it with the pulvis lyttæ or some stimulating lotion during the space of six weeks. Dr. Hausbrand first employed active bleeding in the earliest stage of the disease, then made deep scarifications of the wound, encouraged the flow of blood, washed the wound with salt and water, applied an ointment composed of unguentum basilicum and powdered cantharides, and kept up the suppuration during the space of three months at least. Internally, he directed the patient to take for three evenings a powder with camphor and opium, to drink elder tea, and keep up a copious perspiration. Eleven persons bitten by dogs actually mad, treated in this manner, remained perfectly free from the disease. We have noticed these four prophylactic modes of treatment chiefly with the view of shewing the nature and efficacy of the *local* means employed, and the evidence in support of the practice of continuing a discharge from the wound during several weeks. It must be recollected, however, that caution is necessary in

* Dr. Hunter, Transactions of a Medical Society.

* Ed. Med. and Surg. Journal, 1825.

drawing a positive conclusion in favor of any particular prophylactic measure, as the disease is by no means a necessary consequence of the bite; for it is a fact founded on the observation of a considerable number of cases, that upon the average not more than one person out of twenty-five who have been certainly exposed to the bite of a mad dog has become infected with the disease.

In noticing the inefficacy of the Ormskirk medicine, pulvis antilyssus, tonquin remedy, &c., Dr. Hunter says the question may be here asked, admitting the frequent failure of these remedies, have they not sometimes prevented the disease? The answer would certainly be in the affirmative if every person bitten by a mad dog who did not use some means of prevention were seized with the disease. But this is not the case, for in the human species the proportion of those bitten who are seized with hydrophobia is much less than of those who escape, even where no means of prevention are employed; we can, therefore, infer nothing in favour of these prophylactics, because they have been given in cases in which no hydrophobia has supervened.*

The application of a tight ligature to the affected part, at a short distance above the laceration, is strenuously recommended by Dr. Good from the first, even before the process of ablation, and the measure is sanctioned by the authority of Ambrose Paré, Trollet, and other eminent writers. "Analogy," says Dr. Good, "is altogether in favor of this operation, for it is well known to be one of the most important steps we can take in confining the poisonous effects of the rattlesnake and other venomous animals, and of mitigating its violence by the torpor which follows." We have had no experience of the beneficial effect of the ligature after bites from rabid animals, but we see no objection to the adoption of the practice. Cupping-glasses have also been applied to the wound. Celsus even recommended them.† More recently, the cupping-glass has been strongly advised by Dr. Barry, who has performed a variety of ingenious experiments relative to the absorption of several vegetable, mineral, and reptile poisons. It has been his aim to prove that absorption cannot take place in vacuo, and certainly the results of his experiments seem to us satisfactorily to establish the fact. We conceive that the cupping-glass is likely to prove a highly efficacious remedy in cases of wounds inflicted by poisonous or rabid animals, and we strongly recommend its early and diligent application *after* a careful excision of the injured part; for it by no means supersedes the use of the knife. Mr. Youatt rather objects to the cupping-glass, for he expresses a fear lest the virus, forced from the texture with which it lies in contact by the rush of blood from the substance beneath, may inoculate or become entangled with the parts of the wound; still he thinks that it may be useful after excision of the part, but as connected

with the caustic, that it can be of no avail. Amputation has been deemed advisable by some surgeons when the bite has been situated in a part, as in one of the fingers, to which a cupping-glass could not be effectually applied; or when a limb has been bitten in many places, or very deeply in parts not admitting of excision, as through the tarsus or carpus. Mr. Samuel Cooper thinks that under these circumstances immediate amputation might be warrantable *before* the accession of the symptoms. He has noticed a case that occurred at Guy's Hospital some time ago, in which a limb was amputated after the symptoms of hydrophobia had appeared, but without the least check being put to the complaint. "The performance of amputation," this able surgeon justly observes, "previously to the commencement of the symptoms, is a very different practice from that of amputating parts after the symptoms have begun."*

It may be proper here to allude to the plan proposed by Dr. Marochetti for preventing the development of hydrophobia. He believes that the hydrophobic poison, after remaining a short period in the wound, fixes itself for a certain time under the tongue, at each side of the frænum, where one or two little tumours or vesicles appear, in which may be perceived with a probe a fluctuating liquid. Dr. Marochetti states that the usual time of the appearance of these small knots is within the third and ninth day after the bite, and that if they are not opened within the first twenty-four hours after their formation, the poison is re-absorbed into the system, and all hopes of the patient's recovery are banished. He, therefore, strongly recommends that such persons as have the misfortune to receive a bite from a rabid animal should be examined under the tongue immediately, and that attention should be paid to this part during six weeks; for if these vesicles do not appear in this time, he considers the patient to be perfectly secure from future danger. When, however, they are detected, he directs that they should be instantly opened with a lancet, and then cauterized with a red-hot needle; and that the patient should gargle assiduously with a decoction of broom, and take daily one pound and a half of the infusion of the tops of the same plant, or four drachms of the powder. Professor Rossi has also published a case in the *Annali Universali*, in which a cure of hydrophobia is said to have been effected by taking a glassful of vinegar, and the *genista lutea tinctoria* internally, and by having the sublingual glands cauterized three successive times. In the examples of hydrophobia which have fallen under our own observation and that of some other practitioners, the knots or vesicles under the tongue, described by Dr. Marochetti, have been looked for in vain; and, indeed, their supposed presence seems to be a mere anatomical delusion. It may be correctly said that Marochetti's statements have not been confirmed by the general experience of the profession, so that practitioners may be undeceived

* Hunter, opus ante cit.

† De Medic., lib. v. p. 199.

* Good's Study of Medicine, last edition.

in any expectations of security they might be induced to form from adopting his process to the neglect of the means noticed above; for the results of such misplaced confidence would be irremediable. We venture to repeat our conviction of the imperative necessity, in every case of injury from a rabid animal, of deeply and effectually cutting out the bitten part when it can be done with perfect safety, and of the propriety of keeping up a free discharge from the wound for several weeks by the aid of some active external irritant; and that when the operation of excision is inadmissible, recourse must be had to scarification, lunar caustic, or the actual cautery.

Amongst the chief preservative means that have been employed *internally* in conjunction with the local plan of cure, we may merely mention belladonna, cantharides, mercurials, emetics, volatile alkali, broom decoction, and chlorine; for it would be a waste of the reader's time to present him with a detailed examination of the individual efficacy of these several remedies as preventives of the fatal consequences of the bites of rabid animals, since the most ample experience has proved them to be altogether unavailing, and therefore undeserving of future confidence. To the vaunted specifics before named no further allusion is necessary.

Having thus considered the *prophylactic measures* which are indicated, we may next notice the means to be employed *after the disease has been once developed*.

This part of our inquiry is attended with some degree of difficulty, because no successful method of cure has as yet been discovered, after the characteristic symptoms of hydrophobia have once appeared. "There is, indeed, no disease," as Dr. Good justly remarks, "for which so many remedies have been devised, and none in which the mortifying character of vanity of vanities has been so strikingly written on all of them. In the loose and heterogeneous manner in which they have descended to us, they seem, indeed, to have followed one another without rational aim or intention of any kind." The whole subject of treatment is difficult and afflictive. We scarcely know how to reply to the important question,—What plan of cure is a practitioner to adopt when he meets with a case of rabies? but it is necessary to attempt an explanation of the mode of treatment which, on the whole, seems to be the most suitable for adoption.

The limits of this article would be extended to a very unnecessary length, were we to do much more than enumerate the various remedies that have been tried in this disease; but a brief notice of them is required, for without a knowledge of what has been attempted, much time must be lost in useless trials and fruitless repetitions.

Amongst the various articles in the *materia medica* which have been employed for the relief or cure of hydrophobia, *opium* is entitled to be first mentioned. This drug, in various forms and in very large quantities, has had the most full and ample trial; but experience has too often proved its inefficacy in

this disease. Dr. Vaughan exhibited fifty-seven grains of opium in the course of fourteen hours with little or no effect upon the symptoms; and in one case Dr. Babington administered one hundred and eighty grains in eleven hours, without any benefit, and without even procuring sleep.* In another instance Dr. Marcet gave opium, iron, and arsenic, to a great extent, but with a like unsuccessful result. Majendie introduced opium in large quantities into the veins of rabid dogs, but without producing its ordinary narcotic effect; and Dupuytren and he afterwards injected eight grains of the extract of opium, in solution, into the crural vein of a young man labouring under hydrophobia in its severest form; but the experiment only afforded temporary relief, for he expired on the fifth day from the attack of the disease. Dr. Richard Pearson strongly recommends the injection of warm water in very small quantities, and impregnated with narcotic substances, into the veins of hydrophobic patients, for the purpose of subduing the spasms which prevent deglutition. This object being attained, he proposes the administration of a strong cathartic, copious dilution with mucilaginous liquids, camphor, and other antispasmodics; and after the operation of these medicines, sponging the body with cold water and vinegar, and giving at the same time internally the nitric or muriatic acids, and lastly some of the vegetable tonics. Dr. Booth considers the acetate of morphia as far preferable to opium for injection into the veins of the hydrophobic sufferer, as its dose and powers are more definite than those of the latter drug. In conducting the injecting process, he suggests that twenty-four minims of the solution of acetate of morphia (equal to four grains of opium) mixed with two drachms of distilled water, be introduced into the cephalic vein; and then, after waiting for about ten minutes to observe the effect, that the operation be repeated at like intervals until a decided sedative impression be produced.† Dr. Brandreth made trial of injection of the acetate of morphia, as recommended by Dr. Booth, in a well-marked instance of hydrophobia, and found that it mitigated the sufferings of the patient in a most decisive manner. In a case of more recent occurrence, we have ourselves witnessed the injection of the acetate of morphia, but we regret to say that it altogether failed in diminishing the violence of the symptoms and retarding the fatal progress of the malady. The operation was skilfully performed by a very respectable surgeon, Mr. Barton, in the presence of Dr. Hull, Mr. Fernely, Mr. Boutflower, jun., and other medical gentlemen. Dr. Ward has strongly advised opiate frictions in hydrophobia; and in more than one instance they have succeeded in calming the irritability of the system, and obtaining a temporary abatement of the distressing spasms of the muscles of respiration and deglutition. Upon the whole, it may be

* Medical Records and Researches.

† Booth on Hydrophobia.

correctly asserted that opium possesses some claims to future confidence as an antilyssic remedy. *Mercury* is another substance which has been highly lauded for its efficacy both in preventing the disease, and removing it after it has actually appeared. It has been very freely employed internally and by friction, on the authority of Dessault, Kaltschmid, James, Du Choisel, Andry, Selig, Königsdörfer, Walther, and other writers; but unfortunately (as an able reviewer justly observes) there are too many cases on record of persons in whom the external wound has been improperly managed, dying of this complaint, notwithstanding the exhibition of large doses of mercury, to warrant much reliance on this remedy alone.* *Belladonna* has also enjoyed the reputation of a valuable remedy in hydrophobia; but the success which seems to have attended the administration of this drug in the practice of Brera and Massalien, has not been present in a number of cases observed by different physicians. *Acids* (particularly the oxymuriatic and acetic) have been freely used and warmly recommended by Aselli, Previtali, and Brugnattelli; but their inefficacy has been proved in several instances. In the case of a young man named Brassendale, which came under the notice of Dr. Bardsley, the aqueous solution of chlorine was fairly tried, but with an unsatisfactory result. *Alkalies, cantharides, antispasmodics*, as camphor, assafetida, musk, and castor; *diuretics, oil*, internally, and by friction; *arsenic, prussic acid, stramonium, white hellebore, acetate of lead*, and the *warm bath*, have also been used, but with no better effect. *Venesection* has long been considered a powerful remedy in hydrophobia, and has been frequently employed to a very great degree. It has been chiefly advised by those authors who believed in the inflammatory nature of the disease. Mead, Nugent, Fothergill, Shadwell, Ferriar, Hartley, Innes, and more recently Tymon and Schoolbred have been the warmest advocates of an early and vigorous use of the lancet; and several cases have been quoted, on the authority of some of these writers, in proof of the efficacy of the practice. Having carefully perused these histories, we feel a difficulty in admitting that the patients were really rabid. Rutherford, Parry, and Troillet have employed profuse and repeated depletions, sometimes even to deliquium, but without any curative result. Indeed, the evidence of Troillet on this point may be deemed conclusive. "Gueyette," he relates, "a été saigné trois fois jusqu'à défaillance, et malgré la perte de sept livres de sang, la rage a continué sa marche funeste. Une terminaison si contraire à celle que nous avons lieu d'attendre nous a fait jeter un regard plus attentif sur l'observation du Docteur Schoolbred; elle n'a pu soutenir l'épreuve de l'analyse; et nous sommes convaincu que son auteur s'est laissé égarer, comme Nugent, par quelques symptômes, qu'une erreur trop com-

mune a fait attribuer exclusivement à la rage. La saignée à défaillance, que des médecins célèbres avoient déjà conseillée, sera abandonnée de nouveau."* It appears also from the experiments of MM. Majendie, Dupuytren, and Breschet on rabid dogs, that profuse venesection was of no avail in arresting the disease. The *cold affusion* has been attended with palliative effects. In the case of Nixon, who was admitted into the Manchester Royal Infirmary, the patient experienced much relief from having cold water dashed upon his body. He not merely stated how grateful the practice was to him in removing the burning heat of skin and other distressing symptoms, but even solicited its occasional repetition. *Electricity and galvanism* have also produced a diminution of suffering in more than one example of hydrophobia. In less than half an hour from the period of the electrical machine being put in motion, Dr. Bardsley's patient, Warren, became more calm and tractable, and expressed a desire to drink some water, which he was able to perform with comparative ease and readiness, and with no small marks of pleasure and even triumph.† *Tobacco* has occasionally been prescribed, and with apparent benefit. The fumes of the plant have been introduced into the rectum; an infusion of the leaves has been employed in the form of enema; and it has been applied externally as a cataplasm to the scrobiculus cordis. Though this drug has failed in preventing the fatal termination of the disease, still it has been shown to have the power of controlling the violence of the spasmodic actions of the muscles of the throat. The *guaco juice* has been highly spoken of by Sir Robert Kerr Porter as a cure for this affection; but it has been freely exhibited in the London hospitals in more than one instance of hydrophobia, and without success. A few months ago, Dr. Elliotson employed this remedy, but it totally failed. That able physician has also prescribed the *carbonate of iron* in large doses. One hydrophobic patient took nine ounces of the carbonate in the course of eighteen hours, but it proved equally inert. In the case of a boy under the care of Mr. Brownbill, to which we have before alluded under the head of pathology, we made trial of the *strychnia*; but it seemed to exert little or no influence upon the symptoms. In this instance the inhalation of the *nitrous oxide gas* was also attempted on the suggestion of Mr. Jordan, and produced for a short time some degree of exhilaration and a propensity to laughter; but owing to the extreme difficulty experienced in continuing the process, the further effects of the gas were not ascertained. Dr. Bright has advised the adoption of *mineral tonic* remedies combined with some of those diffusible stimuli which are useful in calming the irritability in many hysterical attacks. He has proposed the injection of the muriated tincture of iron into the rectum, as being a powerful chalybeate, and in some cases possessing the quality of

* Edinburgh Medical and Surgical Journal, vol. xxi.

* Traité de la Rage, p. 367.

† Medical and Physical Journal, vol. xiii. p. 159.

allaying spasmodic action.* *Violent sweating*, through the influence of highly heated air, has been recommended to the notice of the profession as a remedy in this affection; but we are not aware that it has been sufficiently tried to enable us to determine its real claims to further use. We have seen the hot air bath of great advantage in a very severe instance of traumatic tetanus; and hence it may be deserving of trial in hydrophobia. *Tracheotomy* has been proposed by Mr. Mayo, as an experiment in this malady. Dr. Hunter has alluded to two cases in which the relief obtained by *running* was very remarkable; in one the amendment was so considerable, that the patient did not look like the same person after running about a quarter of a mile. This experiment, however, has not been since adopted.

Having arrived at the conclusion of our inquiry into the history and treatment of rabies, and examined the various means that have at different times been proposed, with the view of arresting the progress and subduing the symptoms of the disease, it is painful to be obliged to confess that no specific or successful mode of cure have up to the present period been discovered. It has been shown that men of the first eminence have directed their utmost attention to the subject, but have unhappily failed in establishing a remedy for this justly reputed opprobrium of medicine. Under these circumstances, humanity seems to dictate the adoption of those measures which best serve to soften the torments of the unhappy patient. As far as we are capable of judging from recorded facts, we should say that the liberal administration of stimulants and cordials, the internal exhibition of opium in very large doses in the interval of the exacerbations, injection of narcotics into the veins, opiate frictions and opiate clysters, abstraction of blood from the upper part of the spine by cupping, electricity, the tobacco injection, and the cold affusion, are the means which have had the most decided power in producing a remission of the more distressing symptoms of hydrophobia, and thus alleviating the agonies of the wretched sufferer.

We think there is reason to hope, from the more correct information we have of late obtained respecting the manner in which the disease affects the animal, and from the frequent and careful performance of experiments with the virus itself, that a more intimate acquaintance with the nature of the poison may yet be obtained, which may at length lead to the establishment of a successful method of treatment. In order to forward so desirable a result, it becomes each member of the profession to make new experiments on the subject; to watch with minute attention every case that occurs in the course of his practice; faithfully to notice every circumstance of importance connected with the malady, and to adopt any untried plan of cure founded on rational principles. "It would, perhaps, at length con-

tribute," the late Dr. Fothergill has justly remarked, "to remove this uncertainty, if those who are applied to on these interesting emergencies would consider themselves as obliged, by the honour of their profession and the ties of humanity, to note with all possible precision and impartiality every incident in the progress of this disease; and whether they pursue the hints here suggested, or take up more rational ones from their own store, would communicate the result to the public. By this method, the field of conjecture would be contracted, and our successors directed to new objects of investigation. The result would be not less honourable to those who engage in the search, than beneficial to mankind in general."

The prescribed limits of this article will not permit the consideration of the several judicious plans which have been proposed by some eminent and enlightened members of the profession for extirpating canine madness from the British isles.

(J. L. Bardsley.)

HYDROTHORAX.—From *ὑδρῶς*, water, and *θώραξ*, the chest. *Water in the chest*. This term is now confined to designate the effusion of serum into the cavities of the pleuræ.

Although so celebrated an author as Laennec has divided hydrothorax into idiopathic and symptomatic, we are by no means inclined to coincide with his views. If idiopathic hydrothorax mean any thing, it means a disease in which effusion of serum is the only affection, and in which there is neither inflammation of the pleuræ nor serious disease in any other organ. Such an affection we have never seen, nor have we found upon record any satisfactory example of it. At the same time Laennec himself has stated that even in the dead body it is not always easy to distinguish between this, which he terms hydrothorax, and chronic pleurisy; the fluid effused exhibiting every variation from a limpid, pellucid serum to concrete albumen in the form of false membranes. Dr. Forbes has observed, in a note to this place in his translation of Laennec, that English authors are better acquainted than the French with the inflammatory origin of many dropsies; and from the hint thrown out, we have little doubt but that with us he is inclined to refer all such cases to different degrees of pleurisy. That effusion of serum is the first symptom in this disease Laennec himself has stated, and that he has found it so marked as to dilate the chest within a few hours from the commencement of inflammation. The cases also which he has given as illustrating idiopathic hydrothorax tend still more to confirm this view of it; for although the first patient recovered once under the use of acetate of potash, she had in a few months afterwards a fatal attack of pleuro-pneumonia on the right side; thus shewing a tendency to inflammation in the pleura; and her recovery on the former occasion might have been owing to the effusion which thus, if we adopt Dr. Parry's views, resolved the inflammation. In the second case, not only had the patient

* Medical Reports, part ii. p. 607.

suffered from organic disease of the heart, but while the lower two-thirds of the right pleura contained a limpid fluid, the upper portions were united by plentiful cellular tissue, which was strong and obviously of long standing, and necessarily the result of previous inflammation. Rayer, in the article *hydrothorax* in the *Dictionnaire de Médecine*, also adopts this view of the affection we are considering, and remarks, that although Lieutaud has noticed four cases out of seventy in which no organic lesion is mentioned, yet they are related with so much brevity as to leave very considerable suspicion of their being incomplete; more especially as Morgagni has not left a single example of hydrothorax in which some such lesion did not exist. For a more complete development of this part of our subject, we refer, therefore, to the article *PLEURISY*, (for the affection in question is really a pleurisy, and must be treated upon the principles applicable to that disease,) only here calling particular attention to what appears to us to be the fact, that there is no such disease as hydrothorax independent of inflammation of the pleuræ or organic disease of some other part.

That affection, however, which Laennec has termed *symptomatic hydrothorax*, is of very frequent occurrence, and, to use the language of this author, there is scarcely any disease, acute or chronic, general or local, in which it may not exist. Affections of the lungs and of the heart, however, are those which it most frequently accompanies, and it is by interfering with their functions that suspicion of the presence of effusion is often first excited.

In this as in most other diseases, no one symptom will suffice to detect its existence: we must have recourse to its past history as well as to its present state; and when the symptoms appear to fail us, the greatest advantage may be derived from percussion and auscultation.

Symptoms and diagnosis.—Were we accurately to speak of the symptoms of hydrothorax, we should be compelled to say with Laennec, Rayer, and other modern authors, that there is really no symptom of the disease excepting oppressive dyspnoea. It would, however, be dismissing the subject too hastily to remain here, for we may certainly trace its history somewhat more satisfactorily.

As we have already stated, that which has been termed *hydropleuritis* is, in fact, an acute pleurisy, and the fluid effused is ill-maturated pus, or serum mixed with the common products of inflammation, pus and coagulable lymph. In all these cases also the pleuræ exhibit more or less alteration, in being more vascular than usual, or in being covered with factitious membranes more or less firm. When, therefore, the fluid poured out in such cases is very considerable, they must be regarded, not as dropsy of the chest, but as cases of empyema, and will require the treatment appropriate to this affection. (See *EMPYEMA*.) Omitting, therefore, any farther mention of these cases, we proceed to the history of symptomatic hydrothorax.

As this is the consequence of a great variety of maladies, so the early symptoms are rather referable to the original disease than to the effusion. Thus, when effusion follows disease of the heart, the early dyspnoea, the starting during sleep, the inability of lying down, the difficulty of mounting an ascent, are dependent upon the original malady, and are frequently observed when little or even no fluid is discovered in the cavities of the pleuræ. These symptoms are, however, unquestionably aggravated by the supervention of dropsy, and when the latter originates from organic disease of the heart, it is itself an additional source of exhaustion to the system, and materially accelerates the fatal termination.

To whatever affection of the thoracic viscera hydrothorax is to be traced, the earliest symptom of effusion is an oedematous state of the eyelids, occurring chiefly in the morning. This is sometimes so little remarkable, that it escapes attention until inquiry be made by the medical attendant; and often it is only remembered when the feet and ankles have been observed to swell in the evening. That there is no exception to this rule we will not venture to assert, but in all the cases which have been presented to our notice, we have never yet met with any. The progress of the disease from this point is exceedingly variable, and this variableness seems to depend much upon the nature of the original affections. In diseases of the heart the early progress is usually slow, the breathing being manifestly more difficult than before the external oedema was perceived, but for some time not aggravated in any remarkable degree. Gradually, however, the external oedema increases, and, *pari passu*, the thoracic oppression, the difficulty of lying down, the dyspnoea, &c. become more distressing. At first, probably, little attention is paid to the difficulty of assuming the recumbent posture, the patient satisfying himself with having his head raised by more pillows. The necessity for having additional pillows continually augments, till at length perfect orthopnoea is established, and he is only able to sleep in a chair. The dyspnoea undergoes also at times very severe exacerbations, the cause of which is not very readily ascertainable. In a tray painter, whom we examined a few years ago, these paroxysms came on every morning between two and three o'clock, and lasted for an hour or more. He was compelled by the sense of suffocation to start out of bed, and while the attack lasted he placed himself against an open window, gasping in the most terrific manner for air. We saw him only three days before his death, which took place suddenly, and on examination the lungs were found to be oedematous; upwards of two quarts of serum were contained in the cavities of the pleuræ, and a few ounces of coffee-coloured fluid in the pericardium. The only other morbid appearance in the whole body was hypertrophy of the left ventricle. While the symptoms now referred to continue to increase, the face likewise becomes more and more oedematous; the cheeks assume a purple hue,

and the lips become livid and at times almost black. The duration of this state varies considerably in different individuals, sometimes lasting for weeks without any alleviation of symptoms, sometimes admitting of great relief by medicine, and intervals of almost perfect ease; at other times its progress is extremely rapid, a few days only intervening between the first symptoms of effusion and dissolution. The termination is in many cases very sudden, and in fat individuals sometimes a very slight effort is sufficient to break the thread of life. It is no unusual circumstance for such persons to die while in a privy, apparently in the act of evacuating the bowels, the slight straining which they are then compelled to make being more than the system is able to bear.

In the symptoms which we have now enumerated, we have endeavoured as much as possible to confine ourselves to those which may fairly be regarded as the consequence of effusion. They are, however, in general so much complicated with the symptoms of the original disease, that probably, notwithstanding these precautions, we may have been led into error. It must, however, be remembered that the original disease during this time is not stationary. Valvular concretions may continue to increase; aneurisms become more and more dilated; or whatever other organic change the heart may be the subject of, be proceeding, independently of effusion, to a state inconsistent with health and life. Accordingly, the symptoms of these changes are aggravated at the same time: the palpitations become more frequent and more severe; frightful dreams, sudden starting from sleep, &c. &c. more and more marked; and the vital powers are manifestly daily yielding. It ought not to be forgotten that these two diseases thus acting upon each other, may give rise to such a congestion in the lungs as will be best relieved by bleeding. Much caution and attention, however, ought to be paid to the state of the patient before we conclude that this is the case, since if bleeding be unnecessarily resorted to, it will unquestionably debilitate the patient and hasten his dissolution.

What we have now said refers to hydrothorax as dependent upon disease of the heart; it sometimes, however, succeeds to bronchitis and pneumonia; and in this case the progress is somewhat different. The palpitations and other cardiac symptoms are usually wanting, and there is nothing more manifested than increased dyspnoea. Previously to this becoming very marked, however, the face and feet swell as in the former instance; the patient then requires the head and shoulders to be raised, and at length, as in the former case, he is unable to lie down at all, but remains constantly in a sitting posture. In these cases the termination is seldom so sudden as when the heart is diseased, neither does the countenance exhibit in the same degree the purple and livid appearance. This, however, may be owing to the fact, that the effusion is seldom so great when the consequence of disease of the lungs, as when attended by cardiac disease;

and it seldom occurs till the original disease has so far weakened the system as of itself to threaten a speedy termination.

In addition to the symptoms and history now given, we have yet farther means of diagnosis in succussion, percussion, stethoscopic auscultation, and admeasurement.

Succussion, as has been already explained under the article AUSCULTATION, consists in forcibly shaking the patient's body and observing the sound thereby produced; and, at the same time, to produce any appreciable sound, it requires the presence of both a gaseous and a liquid fluid in the chest. In hydrothorax it can only be serviceable when the cavity of the pleura communicates with the external air through an aperture of the lungs, or when gas is evolved within the same cavity without any such aperture. We are not, however, aware that either of these circumstances has been ever noticed in the real hydrothorax, although the former is common enough in empyema arising from the bursting of a pulmonary abscess into the cavity of the pleura.

Percussion returns a dull and flat sound over every part of the chest where there is effusion, and the extent of the effusion may be partly judged of by the extent of surface which affords the dull sound. There are, however, many other diseases of the chest besides hydrothorax which prevent percussion from affording the healthy degree of resonance, and to distinguish hydrothorax from these we must be indebted to other means, and among these the stethoscope is one of the most valuable.

The stethoscope, if employed very early, and while yet the effused fluid is in very small quantity, affords that peculiar sound of the voice which Laennec has termed *egophony*. This, however, will very rarely happen, for usually the effusion is considerable before application is made for assistance. The only information which the stethoscope affords under these circumstances, is a want of respiration every where excepting at the root of the lungs.

When, however, we have thus learned from percussion and stethoscopic auscultation that the lungs are impeded in their functions, we have yet to learn what the change is which thus prevents the ingress of air, whether the impediment arises from condensation of their substance, whether from empyema or real hydrothorax, or from any other cause, such as aneurisms, tumours, &c., compressing their substance. In order to arrive at this information, we must estimate the general symptoms and those afforded by percussion and stethoscopic auscultation together.

In the article EMPYEMA, the principal affections have been enumerated which might be confounded with that disease, as tubercular consumption, hepatization of the lungs, tumours in the cavities of the pleura, &c.; and for the most part the same means of distinction exist between these affections and hydrothorax. It still remains to be shewn what means are afforded us of distinguishing empyema from hydrothorax, and this can only be done by an

accurate investigation of the preceding symptoms.

In hydrothorax the serous diathesis always prevails, and there is, at the same time with effusion into the cavities, effusion in the cellular tissue either of the face and ancles only, or of the extremities, sometimes of the whole surface of the body. Now, even in empyema we may also have anasarca partial or general, but upon inquiry we shall in this case find that the symptoms of the chest have long preceded the appearance of dropsy, and the latter, instead of appearing the direct consequence of the thoracic disease, would rather appear to be the mere result of debility;—the cough, the dyspnoea, the emaciation especially, having usually proceeded to an extreme before there was the slightest appearance of effusion. In hydrothorax, on the contrary, the appearance of œdema of the face and ancles long precedes the more severe affection of the chest: sometimes even the ancles attract attention for a little while by swelling, and then subside for a considerable interval, or they swell so slightly as to be forgotten. In empyema, again, the stethoscope will usually prove that respiration is well carried on in one lung at least, although the other may be perfectly useless. This, however, can seldom happen in hydrothorax; and were we to judge from our own observation, we should even be inclined to say that it never happens. Whenever hydrothorax exists to any extent, that is, whenever there is any considerable quantity of serum in the cavities of the pleuræ, the lungs participate in the dropsical disposition, and fluid is effused into their cellular texture. This must, therefore, materially impede respiration, and as it must exist nearly equally in both lungs, there can never be the decided difference between the two sides that is observable in empyema.

Perhaps we ought not to omit all mention of *admeasurement*, more especially as effusion, real dropsical effusion, may exist to a much greater degree in one side than in the other. That side in which the effusion is greatest will certainly be more dilated than the other, as is the case in empyema; but if with this difference of measure we unite the indications of the stethoscope, we cannot be in much danger of confounding the two affections.

Bichat has recommended an experiment in doubtful cases of hydrothorax which deserves some notice, especially in distinguishing it from empyema. This consists in placing the patient in an horizontal position, and pressing upon the abdomen from below upwards, thus limiting the descent of the diaphragm. The fluid effused into the pleuræ is thus forced to compress the lungs, the sense of suffocation becomes most painful, and the countenance assumes a livid hue. Now as distinguishing hydrothorax from any diseases occupying both sides of the chest, this appears scarcely available; but in distinguishing it from empyema, which occupies only one side, it may be a most valuable resource. Dr. Townsend, in the admirable paper upon empyema, to which we have before

referred, remarks that if the pressure be made on that side in which effusion is present, no result follows, because this side being already useless, no additional pressure can add to the inconvenience; but if it be made on the sound side, this being the only side which is useful for respiration, the expansion of the lung is prevented, and the utmost distress induced. In distinguishing hydrothorax, then, from empyema, much use may be made of this experiment, although it by no means answers in the manner which its celebrated author proposed.

Prognosis.—The prognosis of hydrothorax is always unfavourable, because it is never a simple disease, but always the consequence of some other malady, which would, even without effusion, eventually terminate in death. This opinion, however, is only applicable to a complete restoration to health, for to a comfortable state it is frequently in the power of medicine to restore the patient. So far as the mere effusion is concerned, it may in many cases be removed again and again; and as this is often the most threatening source of danger, the prognosis may for a time be reversed. Still every fresh occurrence of dropsy of the chest makes even a temporary recovery less probable, and in giving any opinion of the disease we must take into our consideration both the stage of the original disease and the frequency with which effusion may have occurred. Under all circumstances our opinion ought to be most guarded, and it is at least wise never to omit the announcement that death may be sudden.

Appearances on dissection.—If we were to enumerate all of those which are at different times found in hydrothorax, we could scarcely omit any long exhausting disease of the human body, certainly none of the thoracic viscera. This would, however, be proceeding much farther than would be useful. Some diseases, however, are much more liable to terminate in hydrothorax than others, and such are those in particular of which the heart, the great bloodvessels, and the lungs, are the subjects. Accordingly, valvular disease of the heart, active and passive aneurisms of the same organ, aneurisms of the aorta and arteria innominata, chronic bronchitis, and tubercular consumption, are more frequently met with than any other organic changes in hydrothorax. Some changes are also observable in the state of the pleura, but this is only very manifest when actual inflammation has been present. We have seen a vascular state of this membrane, and various degrees of factitious membrane deposited upon it.

The quantity of fluid varies very considerably, and in our experience it has always been greater when dependent upon disease of the heart and great bloodvessels than on any other cause. M. Itard places the largest quantity at twelve or fourteen pints, and Portal quotes a case from Wolfius in which sixteen pints were found. Morgagni seldom mentions the precise quantity, but usually states it at some pounds. With one exception, the largest quantity we have met with did not exceed nine pints. In the excepted case, which was an

aneurism of the arteria innominata, the quantity effused must have been at least fourteen or fifteen pints.

The colour of the effused fluid is usually amber, sometimes, however, mixed with coagulable lymph, but this only happens when there has been inflammation of the pleura. Laennec has indeed very justly observed that from the appearance of the effused fluid alone it is not always easy to decide whether the affection has been hydrothorax or empyema, the serum assuming many grades between a limpid fluid and coagulable lymph. This fact is of great importance in practice, as Dr. Forbes has remarked: it is essential that the physician remember that the inflammatory and serous diathesis may exist together, or supervene one to the other. The plan of treatment must therefore be varied accordingly.

Like the effusion into the other cavities of the trunk, the fluid is sometimes of a dark coffee colour, sometimes bloody, and assumes every variety of hue between the pellucid serum and blood itself.

Treatment.—The same general principles apply to the treatment of hydrothorax which have been mentioned under the article *Dropsy*. Although the original cause of effusion is an affection of some organ of the chest, or some disorder of the general system, yet the immediate source is the serous membrane, and regard must be had to its condition. Even in a very weakened state of the body the pleura may become inflamed and demand an antiphlogistic treatment. When this is the case, it is an important object of inquiry how far antiphlogistic remedies may be carried with advantage or even with impunity; and upon this point some few considerations present themselves to our notice.

When towards the termination of chronic diseases local inflammation occurs, we have a very different physiological state of the system to contend with from that which would be present should such inflammations take place from an immediately previous good state of health: not only under these circumstances have we no general plethora to overcome, which indeed might happen when the system had not been weakened by disease, but there is a positive wasting and probably actual inanition. Now even in common circumstances it is never advisable to carry bloodletting farther than is sufficient to overcome the immediate inflammation, for although no evil result may be at once apparent, no one can have followed the footsteps of some modern bleeders without seeing the most deplorable consequences of over-depletion. Months and even years are often necessary to restore the system to that equilibrium in which the *mens sana in corpore sano* can again be enjoyed. We have no hesitation in asserting that many of the most lamentable cases of hysteria and habitual nervousness owe their origin to this mis-called heroic practice, and in females particularly that helpless capriciousness, which is so often burthensome to themselves and tormenting to their friends, has been derived from repeated bleedings for pains

in the side, which have upon very slight investigation been referred to the presence of acute pleurisy. If then this happen with persons in health when bled improperly, the consequences of unnecessarily large bleedings in chronic diseases are still more disastrous. In the latter stages of tubercular consumption we have seen patients hurried to their graves by wild attempts to cure a pleurisy, without any consideration of their previous state, and even in pneumonia fatal effusion has instantly followed a large bleeding, when perhaps a moderate one would have restored the individual to health. In the treatment of hydrothorax dependent upon an exhausting organic disease, an error in this respect would be almost certainly fatal, for we well know that hemorrhage, even without previous debility, is one cause at least of dropsical effusions.

By what we have now said, however, we by no means intend to proscribe bleeding in water in the chest, but merely to urge that due caution be practised in employing it. Two circumstances may occur in hydrothorax which may render bloodletting necessary, the occurrence of pleurisy acute or sub-acute, and congestion in the lungs: the latter is peculiarly liable to happen when hydrothorax is connected with valvular disease of the heart. In the former case local bleeding is always preferable, both because it may be taken much more immediately from the seat of disease, and also because it has less effect upon the general strength of the system. Another advantage is derivable also from cupping, which neither general bleeding nor leeches are calculated to afford, and this is a more permanent determination of blood to the external surface from the action of the cupping glasses. That cupping has a decided advantage over leeches need hardly be mentioned. In our opinion the latter never ought to be used when the former can be employed. Both the quantity of blood taken is more satisfactorily ascertained, and the patient is not fatigued or inconvenienced in any degree equal to what is the consequence of employing leeches.

When it is necessary to draw blood on account of congestion in the lungs, recourse must be had to general bloodletting, and the quantity must be guided by the effect upon the disease. We know of no very certain sign that this congestion has place when hydrothorax is present, excepting the occurrence of hemoptysis; and wherever this happens with valvular disease of the heart, we should not hesitate to bleed, and it will usually be found advisable to repeat the bleeding at longer or shorter intervals. In general it will be necessary to take only a small quantity of blood at a time, sometimes not exceeding six or eight ounces; but the benefit afforded by this is very decided, and the debility induced is not enough to prevent recourse being again and again had to venesection for relief.

Purgatives and diuretics naturally suggest themselves as the medicines most likely to afford relief in hydrothorax, and to each belong advantages which are not possessed by the other.

The relief afforded by elaterium and croton oil is unquestionably much more speedy than that which can be obtained by the employment of diuretics. Unfortunately, however, they exhaust the patient in a much greater degree, and cannot be safely employed in a very debilitated condition of the system. The mode of giving elaterium has been mentioned under the articles anasarca and dropsy, and we have nothing to add to the observations there made. We may make a similar remark regarding digitalis and other diuretics. Here we will do no more than repeat what we have frequently said already, that the dropsy is only symptomatic, and that it is to the cure of the original affection that we must look for the perfect restoration of the patient; and our success in practice will mainly depend upon the accuracy of our diagnosis as to the original cause of the effusion.

The last point to which we shall allude in the treatment of hydrothorax is the propriety of tapping, an operation which we can scarcely conceive applicable to genuine hydrothorax. Most of the cases in which paracentesis thoracis has been employed, were in fact cases of empyema; and unquestionably there are many instances on record in which complete success was obtained by its performance. In the article hydrothorax, in Good's Study of Medicine, we have but another instance in addition to those referred to by Dr. Forbes, of practitioners confounding empyema and hydrothorax together. He has mentioned a successful case by Dr. Arthur of Dublin, which, without doubt, was an instance of empyema, as it had been the result of a preceding pleurisy. But empyema is usually confined to one side of the chest, the opposite lung being comparatively healthy; and hence, by drawing off the fluid, we have some chance of the compressed lung recovering itself, and we at least take off any inconvenience which may arise from the quantity of fluid narrowing the cavity of the sound pleura. In hydrothorax, on the other hand, both sides are affected, though perhaps not in an equal degree; and whenever the effusion is sufficiently great to suggest such an operation, there is the greatest probability that the cellular texture of the lungs themselves is likewise the seat of effusion. Hence it must be always doubtful to which the dyspnoea ought to be referred, effusion within the cavities of the pleura, or effusion within the cellular tissue of the lungs; and at the best, the usefulness of the operation must be very problematical. It is not, however, very likely that in real hydrothorax it will ever be proposed.

(John Darwall.)

HYPERTROPHY, (from *ὕψις* and *τροφή*, signifying an excess of nutrition,) is a term applied by pathologists to that condition of a tissue or organ which presents an increase of substance, not arising from any transformation of tissue, or from the development of any morbid product, but simply from a preternatural growth of its proper organic textures. For example, a muscle is said to be in a state of

hypertrophy when its size exceeds the ordinary standard, provided it still retains its muscular structure; but the term hypertrophy could not with propriety be applied if the increased size of the muscle were produced by the transformation of its fibres into fat, or by the development of a tumour in its interior.

As hypertrophy is only an increased development of the natural structure, it cannot strictly be considered as constituting a disease, unless when it deranges the functions of the hypertrophied organ, or exercises an injurious degree of pressure on the neighbouring parts. The muscles on the fore-arm of a pugilist or of a blacksmith, though hypertrophied to double their natural dimensions, are so far from constituting a disease, that they afford a good criterion of the health and strength of the individual; whereas there are few diseases more formidable than a similar condition of the muscular walls of the heart. Indeed it is only of late years that hypertrophy has attracted the attention of anatomists as occurring in any other organ than the heart. The accurate researches of modern pathologists have, however, clearly demonstrated that several tissues, especially the muscular, the adipose, the cellular, the mucous, the cutaneous, the nervous, the vascular, the fibrous, and the osseous, are liable to this affection; and that any organ into whose composition these tissues enter, may be generally hypertrophied throughout its entire structure, or may have the hypertrophy confined to one or more of its component parts. Sometimes, indeed not unfrequently, it happens that by virtue of a sort of balance in the nutritive powers of the part, in proportion as one tissue is hypertrophied another becomes atrophied, in which case the original structure of the organ is so completely changed, that it becomes exceedingly difficult to recognise it. In hypertrophy of the white acini of the liver, accompanied with atrophy of the red acini of the same part, the natural appearance of the organ is materially changed; and in those cases where its cellular tissue is so hypertrophied as to form large masses of a pearly white colour, intersected by opaque membranous septa or partitions, producing an appearance not unaptly compared to the section of a turnip, the natural structure of the viscus is so completely altered that pathologists have not hesitated to refer the alteration to the development of the non-analogous accidental production named scirrhus.

As the effect of excessive nutrition is to increase the number of molecular atoms which enter into the composition of the part, it generally follows that a tissue or organ in a state of hypertrophy becomes thicker and larger than in its natural state. Sometimes, however, the effect of hypertrophy is to increase the density rather than the bulk of the part, as is exemplified in hypertrophied bones, which occasionally become as dense and as compact as ivory, without undergoing any change in their external form or dimensions. Indeed the size of an organ would in many instances afford a very erroneous index of the state of its nutrition, for we know from observation that the hollow organs may be

in an extreme state of hypertrophy without having their size apparently increased, in consequence of the supernumerary particles being deposited on their internal surface, and at the expense of their cavities, as in concentric hypertrophy of the heart: and that, on the other hand, these organs may be greatly increased in size without being in the slightest degree hypertrophied, as is exemplified in the skulls of hydrocephalic persons, and in passive dilatations of the heart, bladder, stomach, &c.; in all of which cases the parietes of these organs are in fact thinner than natural, and their increased size is produced by mechanical distention independently of any increase in the number of their integrant particles. Thus it appears that the natural cavity in a hollow organ may remain unaltered in its dimensions, or may have its capacity either increased or diminished, at the same time that its parietes are hypertrophied. When the dimensions of the cavity remain unaltered, the thickness of the walls, as compared with their ordinary standard, will afford a correct index of the state of their nutrition; when the capacity of the cavity is diminished, the walls may appear considerably thicker than usual, in consequence of the contracted state of their muscular fibres, independently of any increase of substance; and on the contrary, when the cavities are much enlarged, their walls may appear thinner than usual, when in reality their substance is increased, though from its excessive distention it is apparently diminished.

But it is not in the hollow organs alone that an alteration of size may take place independently of any increase of the nutritive function, for considerable enlargement is often produced in various organs by an accumulation of blood in their capillary vessels. There is perhaps no viscus that exhibits this enlargement from congestion in a more marked degree than the liver, especially in those cases where any obstruction exists to the free exit of its blood. We recollect one case, particularly, of aneurism of the aorta compressing the inferior vena cava so as to obstruct considerably the flow of blood from the liver, in consequence of which that organ was enlarged to such a degree as to descend almost to the crest of the ilium. Suddenly, however, the aneurism gave way, and the pressure being thereby removed from off the cava, the hepatic veins were allowed to unload themselves, and the liver had nearly resumed its natural situation and dimensions when the post-mortem examination was made. The spleen is likewise often greatly increased in size by the accumulation of blood in its interior. We have repeatedly observed this effect produced in those cases where the liver was small, indurated, and knobbed on its surface. Another reason why the size of an organ does not always afford a correct criterion of the state of its nutrition is, that the hypertrophy is often confined to one elementary tissue of the part, while one or more of the other tissues which enter into its composition waste away and fall into a state of atrophy, which more than compensates for the increased size of the hypertrophied tissue.

Instead of increasing either the size or den-

sity of the hypertrophied tissue, it sometimes happens that the exuberance of nutrition is manifested by the formation of vegetations or projections from its surface, as in fungoid excrescences of the mucous membrane, exostosis, &c.

Hypertrophy may exist simple and uncombined, or may co-exist with other alterations of the tissue or organ affected; thus it may be combined with hyperæmia, or on the contrary with anæmia; hence it is that we sometimes find the parts affected of their natural colour, sometimes presenting different shades of red or brown, and sometimes, also, colourless and exanguinous. In like manner their consistence is in some cases unaltered, in others, (and they are the most numerous,) increased, and in others again diminished, the tissue hypertrophied being at the same time in a state of softening.*

We shall now proceed to consider briefly the principal alterations produced by hypertrophy in the different tissues and organs, the causes which seem to favour its production, and the effects to which it commonly gives rise.

Hypertrophy of the muscles.—The effect of hypertrophy on a muscle is in general to increase its size and render it firmer than ordinary; its fibres become more condensed, contain a larger proportion of colouring matter, and a less quantity of serous fluid; the fat deposited in the interstices of the muscles usually diminishes, while the bloodvessels undergo an increase of size proportioned to the extent of the hypertrophy. Such are the alterations which the muscles of the pugilist undergo during the process of *training*, as it is termed, and such is also, to a certain extent, the condition of any muscle or set of muscles kept in constant and active exercise. On this principle is founded the system of gymnastic exercises, which, when judiciously conducted, have been found so efficacious in improving the strength and correcting the tendency to deformity so often arising from irregular or defective muscular development. Unfortunately, however, it is not the voluntary muscles alone that are liable to hypertrophy; the muscular structure of the heart and of the air-tubes, of the intestinal canal, and of the bladder, are likewise subject to this affection, and in them it is often productive of the most distressing and dangerous consequences. In these musculo-membraneous organs we constantly find hypertrophy of the muscular fibres produced by any cause, whether organic or functional, which increases the frequency and energy of their contractions, provided it continues to act for a sufficient length of time. Thus, diseases of the valves of the heart or of its great vessels, by opposing an obstacle to the exit of the blood, stimulate its muscular parietes to increased action, in order to overcome these obstacles, and this increased action eventually leads to their hypertrophy; but the same effect may likewise be produced by long-continued palpitations arising from mental emotion, or from any other cause whatever. (See HYPERTROPHY OF THE HEART.)

* *Andral, Pathol. Anat.*

In the same way hypertrophy of the muscular fibres of the bladder is produced by any obstacle to the evacuation of its contents, such as enlarged prostate, fungous tumours, or strictures of the urethra, which obstruct the passage of the urine, and so stimulate the bladder to increase its efforts in order to propel its contents; the same effect is also produced by the presence of calculi or gravel, or by any other cause which irritates the bladder directly or sympathetically, and causes it to contract with greater force and frequency than natural. When the bladder is thus affected, its muscular coat may be uniformly thickened, or the hypertrophy may be confined to certain fasciculi which project from its surface like the muscoli pectinati of the auricles, and give the interior of the organ a remarkable sacculated appearance. These fibres never acquire the red colour which muscles of the same size have in other parts of the body when hypertrophied by exercise; but like the muscular fibres of the intestinal tube, they remain pale, even when hypertrophied to an extreme degree. The muscular fibres of the bronchi likewise acquire an excessive development from the increased exertions which they are called on to make during protracted attacks of dyspnoea or of violent coughing. In old asthmatic persons, and in the still more numerous class of patients who suffer repeated attacks of dyspnoea from organic disease of the heart and congestion of the bronchial membrane, we have constantly found the transverse muscular fibres of the bronchi, which in the natural state are scarcely perceptible, so increased in size as to form distinct fasciculi.

Another frequent cause of hypertrophy of the muscular parietes of these organs is *inflammation*, especially when of a chronic character, and affecting their lining or investing membranes. Thus pericarditis, terminating by the formation of adhesions, is often followed by hypertrophy of the heart; and though it is difficult to adduce positive evidence that inflammation of the internal membrane of the heart is capable of producing hypertrophy of its walls, yet the conclusion is almost justified by analogy. The effect of chronic inflammation of the mucous membrane of the bronchi in producing hypertrophy of the subjacent muscular fibres has already been noticed. A similar effect is frequently produced by irritation or chronic inflammation of the mucous membrane of the bladder, arising from the presence of calculi, &c. In chronic dysentery the muscular fibres of the colon are in general greatly hypertrophied. Hypertrophy of the muscular coat of the stomach is also frequently produced by chronic irritation of the mucous membrane of that viscus.* The hypertrophy of this tunic is usually accompanied with a similar condition of the other submucous tissues, and this state of the viscus is commonly described as the effect of scirrhus degeneration. In such cases, on making an incision through the thickened parietes of the stomach, we find—1. the

times altered in various ways; 2. immediately beneath this, a layer of a milk-white colour, varying in thickness from less than a line to several inches: this is the sub-mucous cellular tissue. 3. Beneath this layer appears another, distinguished by its bluish colour, semi-transparent, and with a peculiar kind of lustre, traversed by an infinite number of opaque lines: this is evidently the muscular coat in a state of hypertrophy. 4. Still more externally there may appear a second layer of a dead white colour and homogeneous texture: this is in fact the sub-peritoneal cellular tissue, which has become thickened and indurated like the submucous. In some cases the cellular tissue remains unaltered, and the muscular coat alone is hypertrophied so as to produce considerable thickening of the stomach or intestines. It is in the pyloric portion of the stomach especially that this form of hypertrophy has been observed; and this is also one of the parts where in the natural condition the muscular coat of the alimentary canal is of the greatest thickness, and its action most remarkable. On opening the abdomen of a living animal we find that the right end of the stomach, the pylorus, and the commencement of the duodenum, are continually animated with a contractile motion. This motion is most distinct during the process of chymification, whence it follows that whatever tends to excite the mucous membrane of the stomach must tend to increase the action of the muscular fibres of the pylorus, and eventually to produce in them a state of hypertrophy.* We have seen these fibres hypertrophied to such a degree as to measure nearly two inches in thickness, and to present a striking resemblance to the gizzard of birds. Dr. René Prus observes that the frequent vomitings which occur in persons labouring under chronic gastritis may contribute very much to produce the hypertrophy of the muscular fibres that so often succeeds to protracted attacks of this disease.†

From whatever cause the hypertrophy of the hollow muscular organs arises, the effect of the excessive development of their fibres is to increase their force and irritability, and consequently the frequency and energy of their contractions. The bladder, when hypertrophied, says Dr. Baillie, becomes extremely irritable, the inclination to make water is frequent, and repeated efforts of the muscular coat are required, which increase its thickness more and more. In like manner the irritability of the transverse fibres of the bronchi is increased in proportion to their increase of development, until the slightest irritation becomes sufficient to excite them to violent contractions. In such cases, any irritation of the mucous membrane produces violent paroxysms of dyspnoea and coughing, which in their turn increase the hypertrophy of the muscular fibres, and so the disease becomes progressively aggravated. Similar effects are likewise produced in chronic

* Andral's Path. Anat.

† Recherches sur la Nature et le Traitement de Cancer de l'Estomac.

* Broussais, Phlegmasies Chroniques.

dysentery by hypertrophy of the muscular fibres of the rectum and colon, until eventually the presence of the least quantity of feculent matter is sufficient to induce the most violent spasmodic efforts for its expulsion.

The symptoms produced by hypertrophy of the heart are of such importance as to merit a special article to be devoted to their consideration; to which, therefore, the reader is referred.—See HYPERTROPHY OF THE HEART.

Hypertrophy of the adipose tissue.—The adipose or fatty tissue is of all others the most subject to hypertrophy: it is in general largely developed in infants immediately under the integuments, but seldom accumulates at that age on the internal organs. After the second or third year the tendency to obesity usually disappears until the period of puberty, at which time, especially in females, it again makes its appearance, though it very seldom becomes excessive before the age of five-and-twenty. It has been calculated* that the average weight of an adult of ordinary robustness is about eleven or twelve stone, of which fat constitutes about one-twentieth part; in some cases, however, it is developed in such enormous quantities as to constitute from one-half to four-fifths of the entire weight: and there are cases on record of persons becoming so prodigiously laden with fat as to weigh from thirty-five to forty stone. M. Dupuytren has published an account of the dissection of a remarkable case of this kind. The individual (who was a poor beggar-woman, totally dependent for her daily sustenance on the precarious contributions of charity,) measured five feet one inch in height and five feet two in circumference. The subcutaneous layer of fat was three inches deep on the thighs, four inches on the glutei, and seven inches on the mammæ. In the interior of the body the only parts which were completely exempt from fat were the skull and the spinal canal. In the thorax there was no fat developed between the fibrous and serous layers of the pericardium; but it was accumulated in enormous quantities at the base and on the surface of the heart, and in the mediastinum, and was also deposited in large masses between the costal pleura and the ribs. The pulmonary pleura contained no fat. In the abdomen, the peritoneum was every where coated with a thick layer of fat, except where it was reflected over the liver, the spleen, and the small intestines: between the peritoneum and the diaphragm it was developed in large quantities, as also between the peritoneum and the muscular coat of the stomach and colon, from the latter of which it hung in fringes two inches long and three quarters of an inch in diameter. In the mesentery it measured two inches, and in the greater and less omentum one inch in thickness. No organ appeared to have undergone the fatty degeneration except the mammary glands. The muscles retained their red colour, and even seemed to have acquired an increased development, as if for the purpose

of increasing their force in proportion to the increased mass which they had to move.* This case exhibits a striking instance of the influence of idiosyncrasy in producing general hypertrophy of the adipose tissue; for the individual in question was scantily supplied with the most meagre diet, and took a great deal of exercise every day; in short led precisely that kind of life which is supposed to be least favourable to the accumulation of fat. Hypertrophy of the adipose tissue may likewise occur as a local affection. We not unfrequently find (more especially in persons advanced in life who have indulged freely in the pleasures of the table) fat accumulated in such quantities in the abdomen, as to give the belly a size altogether disproportioned to the rest of the body. The mammæ in some females are enormously laden with fat; and the quantity of this substance deposited on the glutei muscles is so great in some cases as to constitute an absolute deformity, as in the African woman, named the *Hottentot Venus*, who was exhibited in this country some years ago. Lobstein relates the case of a child, one of whose thighs was so laden with fat as to measure twice as much in circumference as its fellow of the opposite side.†

It seldom happens that fat is developed in such quantities on any of the internal organs as to impede their functions, unless in cases of general obesity; the heart, however, is sometimes greatly overloaded with fat, particularly at its basis, along the septum, and at the apex of the right ventricle. Indeed, this condition of the viscus is by no means uncommon in advanced life even in persons of moderate embonpoint. We have generally found it coinciding with a pale flabby condition of the muscular fibres, and not unfrequently combined with a general dropsical diathesis. It does not appear that this condition of the organ produces any material or permanent derangement of its functions, or that it is characterised by any peculiar symptoms by which its existence may be recognised during life. Fatty tumours are occasionally formed in different parts of the body, and constitute another variety of local hypertrophy of the adipose tissue.

Respecting the immediate or proximate cause of hypertrophy of the adipose tissue, little is known beyond conjecture. Some individuals accumulate fat under circumstances in which others would almost die of inanition. Certain circumstances, however, have been ascertained by experience to be peculiarly favourable to obesity, among which may be enumerated, full living, sedentary habits, and the want of mental excitement. Castration has likewise been observed to promote the accumulation of fat, and the same effect is produced by the removal of the ovaries from the female.

Hypertrophy of the cellular tissue.—The following description of the anatomical cha-

* Dictionnaire de Médecine. Art. *Polysarcie*.

* Journal de Corvisart, tom. xii. p. 262.

† Traité d'Anatomie Pathologique.

racters of this lesion has been borrowed from M. Andral, to whom we are indebted for the first and most accurate account of this morbid alteration of structure.

"The cellular tissue is very frequently affected with hypertrophy: in those parts where it naturally possesses but little consistence, and resembles a sort of organized mucus, it acquires, when hypertrophied, a greater degree of firmness and density; and in the parts where its density is naturally considerable, its laminae and filaments acquire an unusual thickness, become blended together, assume a dull white colour, or a peculiar grey semi-transparent appearance, and offer considerable resistance to the scalpel. When the hypertrophy has arrived thus far, we observe between the organs, or the different parts of the same organ (according to the seat of the disease), a whitish substance in the form of laminae, or of irregular masses, intersected by numerous lines and striæ; and if we examine the structure of these masses, and trace their formation, we find that they are evidently composed of portions of cellular tissue, which become progressively more and more condensed, and finally present the appearance of a homogeneous mass, which, according to its colour and degree of condensation, resembles either the interior of a turnip, with its dull white striæ, the fat of bacon, or imperfect cartilage, such as is found in the fœtus.

"These different alterations of structure have hitherto been confounded under the generic denomination of scirrhus, whereas they are all produced by hypertrophy of the cellular tissue, in some cases simple and uncombined, in others conjoined with some product of a morbid secretion into the areolæ of the cellular texture.*"

Hypertrophy of the submucous cellular tissue of the alimentary canal is very frequently produced by chronic irritation of the mucous membrane, more especially in cases of chronic gastritis and of dysentery. In the urinary apparatus it is also often caused by irritation or chronic inflammation of the membrane to which it is subjacent. Hypertrophy of the submucous cellular tissue of the urethra is one of the most frequent causes of stricture. We have never observed the submucous cellular tissue hypertrophied to any great degree in the air-passages of the respiratory apparatus. The subcutaneous cellular tissue is often very much thickened in the neighbourhood of old ulcers, and of eruptive diseases of long standing. Hypertrophy of the cellular tissue is likewise observed in the parenchymatous structure of several organs: sometimes the proper texture of the part remains unaltered in other respects, and the only change observable is, that the cellular tissue which intersects and supports its structure is rendered thicker, harder, and more opaque than natural. This appearance is often observed in the pancreas, thyroid, and mammary

glands. More frequently, however, the proper tissue of the part falls into a state of atrophy, or even disappears altogether, and the cellular tissue which formed its original frame-work acquires a preternatural development, so as to form considerable masses of a white colour and striated appearance, not unlike the section of a turnip. This alteration of structure we have observed most frequently in the liver and spleen. Another form of hypertrophy of the cellular tissue is that in which one or more of its cells are dilated and their walls thickened, as in the serous cysts which are found in the kidneys and ovaries, and attached to the cho-roid plexus.

Hypertrophy of the mucous tissue.—This is a frequent result of long-continued or often repeated attacks of inflammation. When the mucous membrane of the stomach or intestines is affected with hypertrophy, it generally becomes harder and denser than ordinary, so that it may be torn off in large shreds. This affection is more common in the stomach and colon than in the small intestines: the membrane, while becoming thicker, sometimes preserves a smooth and uniform appearance; sometimes, being thickened unequally, it presents a number of elevations separated by sinuous depressions. In the large intestine the hypertrophy of the mucous membrane is sometimes so excessive that it exceeds in thickness all the other coats taken together. In the small intestines we have seen the valvulae conniventes longer, thicker, and at least twice as numerous as they usually are. When the hypertrophy only affects isolated points of the mucous membrane, it produces elevated patches and tumours of various forms, sizes, and textures, which have been designated by the names of vegetations, fungous excrescences, polypi, &c. according to the forms they assumed, and the varieties of consistence and colour which their texture exhibited.* Sometimes the hypertrophy, instead of involving the entire texture of the membrane, affects only the villi which cover its surface, and in some cases the hypertrophy is confined to the mucous follicles, and the membrane appears studded over with small conical whitish bodies, having each a central pore or orifice in those parts of the intestines where the follicles are isolated; these conical bodies are separate and distinct, but where the follicles are aggregated, they become confluent, and by their assemblage form large clustered patches. Hypertrophy of the follicles occurs most frequently at the lower portion of the small intestines. Like the other varieties of hypertrophy of the intestinal tube, it is usually found in those who have laboured under diarrhœa and other symptoms of local irritation for some period before death.

That portion of the mucous membrane which lines the larynx and bronchi frequently becomes hypertrophied in persons affected with chronic irritation of those parts. The anatomo-

* Op. cit.

* Andral.

mical characters of hypertrophy of this portion of the membrane are nearly the same as in the alimentary canal. In some cases the membrane is generally thickened, in others the thickening is confined to a circumscribed point, where it produces a projecting tumour or vegetation. Andral relates two cases in which the rima of the glottis was almost completely obstructed by whitish cauliflower vegetations of this description. Hypertrophy of the follicles with which the mucous membrane of the air-tubes is so thickly studded, has repeatedly been mistaken for tubercles, and also for the eruption of small-pox. M. Reynaud found the mucous membrane of the bronchi covered with villi in an individual who had laboured under chronic cough and dyspnoea for many years: as no villi are visible in the natural condition of this membrane, their appearance must be ascribed to the effects of hypertrophy. Hypertrophy of the mucous membrane of the minute bronchi, producing considerable diminution of their calibre, is a constant cause of dyspnoea, especially when situated at the orifices of the off-setting tubes. It is to this cause we must attribute the permanent sonorous and sibilous râles that are to be heard in the lungs of some asthmatics. In the genito-urinary organs the mucous membrane presents nearly the same changes from hypertrophy as those we have already described, namely, general thickening or enlargement of its mucous follicles, vegetations, excrescences, &c. These excrescences present considerable variety of texture, some of them consisting of a hard homogeneous tissue apparently destitute of vessels, others of a soft and highly vascular tissue, while others are formed by a mere prolongation of the natural membrane; so that this portion of the mucous membrane, like all others, presents two varieties of hypertrophy, one in which its substance is thickened but its texture not altered, and another in which its texture no longer retains its natural characters.* M. Louis found the mucous membrane of the bladder covered with villi in a patient who had been affected with hematuria for a number of years.† In this case also they must have been morbidly developed, as they do not exist in the natural state of the membrane, or, if present, are so minute as not to be perceptible.

Hypertrophy of the skin.—The cutaneous tissue, like the mucous, may be hypertrophied throughout its entire structure, or in some one or more of its component layers. Andral relates a very remarkable case of general hypertrophy of the skin occurring in an old woman who died of phthisis in the hospital of La Charité. She had formerly had an ulcer on her right leg, but for the last thirteen years the sore had been cicatrized, while the limb had gradually acquired an extraordinary development. On dissection the thickened integuments were found to consist of the following

layers: 1. the corium or cutis vera; 2. the papillary tissue, (*bourgeons sanguins* of M. Gautier); 3. over the papillæ three layers more or less distinct, according to the situation in which the examination was made. The first of these layers appeared like a delicate white line, which, as it dipped in between the papillæ, assumed an undulating appearance: this layer was analogous to that described by M. Dutrochet as the epidermic layer of the papillæ. Immediately over the undulating line just described, appeared another layer of a dark grey or brown colour; when sliced obliquely, it presented the appearance of a net-work formed by a number of delicate dark-coloured filaments crossing each other in every direction: this reticular layer was evidently analogous to the coloured layer in negroes. The third or most superficial layer presented a much greater degree of thickness and hardness than the preceding, and in some places exhibited a degree of consistence equal to that of horn: this layer exists only as a rudiment in man, but in animals is more perfectly developed for the production of the various species of shell and horn. 4. External to all these parts was situated the cuticle.*

Hypertrophy of the vascular system.—This may be considered as it affects the large blood-vessels, or as it is confined to the capillary system of vessels. The pregnant uterus affords an example of hypertrophy or preternatural development of all the bloodvessels which supply the organ; in like manner tumours and all morbid growths are accompanied with an increased development of the arteries and veins which supply them. It is not, however, always easy to determine whether this hypertrophy of the vascular system precedes or follows, is the cause or the effect of the increased growth of the solids. Dilatation of the aorta, especially at its arch, is often accompanied with considerable thickening of its parietes: in some cases this increased thickness is caused by the uniform hypertrophy of all the coats, in others the middle coat only is affected: when in this state, its natural organization becomes much more apparent; the yellow fibrous tissue of which it is composed becomes as evident in the human subject as it naturally is in the horse, but never presents any trace of muscular fibre even in the most extreme state of hypertrophy.†

The morbid alteration of structure described by authors under the name of *accidental erectile tissue*, is caused by hypertrophy of the capillary vessels of the part, which become increased both in size and number, and by being clustered and matted together like the vessels of the placenta,‡ form vascular patches or tumours of various shapes and sizes. In some cases these tumours are composed entirely of the capillary vessels in a state of hypertrophy; in others the tumours are com-

* Andral, Op. cit.

† Recherches sur la Phthisie.

* Andral, Op. cit.

† Ibid.

‡ Lobstein, Anat. Path.

posed principally of other anatomical elements, such as excrescences from the mucous membrane, encephaloid tissue, &c. and the capillary vessels, though greatly increased both in size and number, form merely an accessory part of the structure of the morbid growth.—(See FUNGUS HÆMATODES.) M. Recamier states that the greater number of hemorrhoidal tumours are composed of the capillary vessels of the anus in a state of hypertrophy.*

Hypertrophy of the nervous tissue.—This has been observed in the brain, spinal marrow, and nerves. The anatomical characters of *hypertrophy of the brain*, as described by Dr. Dance in the fifth volume of the *Répertoire d'Anatomie*, &c. are the following: "The convolutions of the brain are compressed and flattened, the intervals between them disappear, and it seems as if the investing membranes of the brain had become too tight for it; the substance of the organ is firm, contains but little blood, and appears remarkably dry when cut into. The ventricles are almost entirely effaced, and the various surfaces of the brain deprived of their ordinary moisture." The affection generally involves both hemispheres, but is sometimes confined to one, or even to a part of one. Andral met an instance where the left thalamus opticus was one-fourth larger than the right, which was of its natural dimensions. Laennec mentions, in the second volume of the *Journal de Corvisart*, his having found the brain compressed and squeezed, as if the skull were too small to contain it, in different individuals whom he had supposed to be affected with hydrocephalus. In a memoir published in the *Revue Médicale* for December 1823, M. Meriadec Laennec has detailed several cases of this disease, from which he concludes that this change of structure is not excessively rare in its occurrence; that it is constantly accompanied with symptoms of epilepsy; that it develops itself with much greater rapidity than hypertrophy of any other organ, which he attributes to the organization of the texture in which it is seated; and, lastly, that the causes of the lead colic appear to have a very great influence in developing hypertrophy of the brain. In some cases the increased growth of the brain is so considerable as to produce an evident enlargement of the skull.

Dr. Elliotson relates the case of a lad who was remarkably precocious; his head was larger than the ordinary size of adults; he suddenly became apoplectic, hemiplegic, and died. On dissection the brain appeared much larger than it should be, and looked as if it had been ready to burst the skull asunder.† A similar case is recorded by M. Scoutetten, in the seventh volume of the *Archives de Médecine*: A child only five years old had an enormously large head, totally disproportioned to his age and size; his intellect was not in any way remarkable; his general health was good; and he died of an acute attack of

gastro-enteritis. On dissection, the dura mater was found firmly attached to the skull, and the brain filled the head so completely, that, on the roof of the skull being removed, it started out as if it had been relieved from considerable pressure: it was principally the superior and posterior parts of the hemisphere which had acquired this extraordinary development; for on making a perpendicular incision into the lateral ventricles, it was necessary to make a section three inches deep to reach them from above, while from below they were within an inch of the surface. It does not appear that this condition of the brain is constantly attended with any particular derangement of its functions; in the case related by M. Scoutetten, there were no symptoms of cerebral disease; in M. Laennec's cases the symptoms were those of hydrocephalus. In those detailed by his cousin M. Meriadec Laennec, the patients had paroxysms similar to those of epilepsy; and in the cases observed by Andral, the symptoms were in some instances analogous to those of epilepsy, and in others the individuals were suddenly seized with convulsions, in the midst of which they expired.*

Hypertrophy of the spinal marrow presents the following characters; its substance is remarkably firm, and so increased in size as to fill up completely the cavity of the vertebral canal.† Laennec found the spinal chord affected in this way throughout its entire length. Andral found the cervical portion of the chord hypertrophied in a child affected with epilepsy. Hutin,‡ Ucelli,§ and Ollivier, have likewise described this disease: respecting its pathology nothing certain is as yet known.

The nerves are also liable to an excessive development from hypertrophy. The ends of the nerves after amputation often become very large, and have their sensibility morbidly increased. Bichat describes this alteration as occurring frequently in the neighbourhood of organs affected with cancer. Gendrin found the nervus saphenus of three times its ordinary thickness, in the neighbourhood of a chronic ulcer on the leg of an old man. The same appearances have been also seen and described by Swan.||

A remarkable instance of hypertrophy affecting detached points along the course of the nerves, in a cretin, is recorded in the London Medical and Physical Journal for 1826. The inferior maxillary nerve presented several swellings as large as peas in all its branches, and the portio dura of the seventh, the eighth pair, and almost all the spinal nerves were similarly affected; the ganglions of the sympathetic were much larger than usual; that opposite the sixth vertebra was as large as a hen's egg flattened. This preternatural deve-

* Op. cit. p. 775.

† Andral, op. cit.

‡ Bibliothèque Médicale, 1823.

§ Clinica dello Spedale della Sta. Maria di Firenze, 1823.

|| Observations on some Points relating to the Nervous System.

* Dictionnaire de Médecine.

† Medical Gazette, No. 217.

lopment of the ganglionic system has likewise been observed by other anatomists in cases of congenital idiocy.* Dr. Duncan found the abdominal portion of the sympathetic nerve increased to three or four times its natural size in a case of diabetes, and Lobstein found the supra-renal plexus greatly hypertrophied in a case of diseased supra-renal capsule. We have already stated, when speaking of hypertrophy of the vascular system, that in all cases of preternatural development or morbid growths, the bloodvessels which supply the part exhibit a proportionate increase of size; the nerves have not been observed to undergo a similar change. In hypertrophy of the nerves, it is important to distinguish whether the nervous pulp is affected, or merely its neurilema.

Hypertrophy of the fibrous tissue.—This is usually produced by irritation or chronic inflammation. This tissue has a remarkable tendency, when hypertrophied, to be transformed into fibro-cartilage, and to pass from thence by a second transformation into bone. These successive changes are frequently exemplified in the margins of the different orifices of the heart and in the valves, the thickening and subsequent ossification of which often arise from hypertrophy of the fibrous tissue, which enters in a rudimentary state into their anatomical structure.

Hypertrophy of bone.—The osseous system presents two forms of hypertrophy, according as its animal or calcareous substance is principally affected. In some cases both these alterations are combined. The bones are sometimes found uniformly enlarged throughout their entire structure, so as to attain in some instances to double their ordinary size and weight. This form of hypertrophy, which seems productive of no inconvenience during life, is seldom or never confined to a single bone, but affects the entire set, whether of the cranium, the thorax, the pelvis, or the upper or lower extremities; it is generally supposed to be congenital. Dr. Gall states that the skulls of idiots from birth are much thicker than those of other men,† and Lobstein remarks that the skulls of dwarfs are not only large in proportion to the other parts of the body, but that they actually exceed in size and weight the skulls of ordinary sized persons.‡ In rachitis the bones affected usually present an increase of size, accompanied with a diminution of weight and consistence, owing to hypertrophy of their animal substance, and the atrophy of their calcareous particles; but in some time after the rachitic affection has subsided, the bones usually attain a preternatural degree of density and strength. Mr. Stanley has observed that the copious deposition of calcareous matter, by which this change is affected, takes place principally at the inner side of the incurvated bone.§ In the disease

known by the name of *fragilitas ossium*, the atrophy of the animal substance, which is the immediate cause of the brittleness, is frequently accompanied with hypertrophy of the calcareous matter. The ivory-like induration, or *eburnation* as it has been termed, is most frequently met with in the flat bones of the cranium, and in the extremities of fractured bones between which a false joint has been established. A minor degree of condensation of the osseous structure is frequently caused by injury and inflammation of the part, or of its investing membrane, as in the union of fractures, &c. Dr. Gall preserved in his museum the skull of a soldier who received several severe blows on his head from the butt-end of a musket at the battle of Ohakow; he became delirious in consequence, and lived in that state for thirty years; the bones of his skull were exactly like ivory. Several anatomists have observed that the skulls of furious maniacs are remarkable for the extreme density and compactness of their texture: this alteration is in all probability connected with the irritation of their meningeal membranes. Nodes and exostoses are examples of local hypertrophy of the osseous system.

Hypertrophy of the lungs.—Laennec has remarked that when one of the lungs is destroyed, or from any cause rendered unfit for the performance of its functions, its fellow acquires a double energy, consequently an increase of nutrition, and after a certain time an augmentation of volume, and becomes at the same time firmer, more elastic, and compact. In place of collapsing when the chest is laid open, it sometimes protrudes from it, as if the space that contained it were too small. In instances of this sort it cannot be doubted that the air-cells are enlarged, and that their parietes have acquired a preternatural thickness, although it is extremely difficult to prove this even with the aid of the microscope. Hypertrophy of the lungs is sometimes formed in a very short space of time: in the case of a man who had pleurisy and consequent contraction of the chest, the opposite lung was found hypertrophied in the highest degree only six months after the commencement of the disease.*

Hypertrophy of the liver.—This gland is frequently affected with hypertrophy. In its natural state it is composed of two distinct substances; one reddish, formed chiefly by the minute ramifications of the capillary bloodvessels; the other white or yellowish, which seems chiefly destined for the secretion of bile; these two substances, together with their framework of cellular tissue, form the parenchyma of the liver, and the hypertrophy may be confined to either of these substances singly, or may affect them all conjointly. These different forms of hypertrophy produce several varieties in the colour, consistence, and form of the organ, which are usually attributed to the development of new morbid productions, such as scirrhus, cirrhosis, &c. There are two de-

* *Essai sur l'Idiotie*, par Belhomme.

† *Dict. des Sciences Méd.*, art. *Crane*.

‡ *Traité d'Anatomie Pathologique*.

§ *Medico-Chir. Trans.*, vol. vii.

* Laennec on Diseases of the Chest.

grees of hypertrophy of the white substance: in the first, the parenchyma of the organ is traversed by lines or circumvolutions of a yellowish white colour; in the second, both its interior and exterior are studded with numerous granules, either isolated or agglomerated, and remarkable for their colour, resembling that of yellow wax; these yellow granules, which are merely the white substance in a state of hypertrophy, Laennec regarded as an accidental tissue developed in the liver, and termed it cirrhosis, from its colour. This affection is described by Baillie as the *common tubercle* of the liver, and is generally known in this country by the name of the *drunkard's liver*. The red substance is likewise susceptible of a very remarkable kind of hypertrophy, which produces in the interior of the liver small hard red masses, distinguished from the surrounding parenchyma by their greater consistence and deeper colour. The cellular tissue of the liver is likewise liable to hypertrophy, in which case the organ loses its peculiar structure and organization, and large patches are found in it occupied only by cellular tissue in a state of hypertrophy. In all those cases the hypertrophy of one of the elementary tissues of the liver is accompanied with a corresponding degree of atrophy of the other tissues; but in some instances they all participate in the hypertrophy, and the parenchyma of the organ acquires an extraordinary development. This increased growth of the parenchymatous structure of the organ may take place in all the three lobes, or may be confined to one of them. Sometimes the right lobe is the one affected, and constitutes almost the entire organ, the left appearing like a small appendage attached to it; sometimes, again, it is the left lobe that is particularly enlarged, and the liver then projects considerably into the left hypochondrium, and, when felt through the abdominal parietes, might be taken for the spleen: in other cases the projection is observed only in the epigastrium, when it might be mistaken for a tumour of the stomach.* The causes that give rise to the different forms of hypertrophy of the liver are as yet unknown, it being a mere hypothesis to attribute them to inflammation; neither are we acquainted with any peculiar symptoms by which they may be detected or discriminated during the life of the individual from each other, or from other organic changes of that viscus. When the liver is much increased in size, its dimensions may be ascertained with tolerable accuracy by the extent of surface, which yields a dull sound on percussion.

Hypertrophy of the spleen.—The spleen is more frequently perhaps than any other organ enlarged beyond its natural dimensions: this increase of size, which is sometimes very considerable, is most commonly produced by the accumulation of blood within the splenic cells, but in some cases arises from a true hypertrophy of the parenchyma of the organ. When cut into, the natural structure seems to be pre-

served, except that it is much more solid and condensed than usual, and is intersected by a number of opaque white lines, formed by the hypertrophy of its septa. Dr. Baillie states, that though this may be looked upon as a monstrous growth of the spleen rather than as a disease, yet it may produce inconvenience by its pressure, and by altering in some degree the situation of the neighbouring viscera.*

Hypertrophy of the pancreas.—This gland is sometimes greatly hypertrophied, and as the cellular substance which intersects its substance participates in the affection, the viscus loses a good deal of its natural appearance, and is converted into a hard white mass, intersected by opaque membranous septa, not unlike scirrhus in other parts of the body.

Hypertrophy of the kidney.—The kidneys are sometimes found much larger than usual, without exhibiting any other change of structure; indeed, it generally happens that when one is incapable of performing its functions, either from original malformation or disease, the other, having double duty to perform, becomes preternaturally enlarged. Hypertrophy of the kidneys is said to be a frequent appearance in diabetes.† We have, however, seen several exceptions to this statement.

Hypertrophy of the lymphatic glands.—The lymphatic ganglions are frequently found in a state of chronic enlargement. We have seen the mesenteric glands in *tabes mesenterica* increased to four or five times their natural size, without presenting any appearance of degeneration or transformation of tissue. Cruikshanks mentions an instance in which the lymphatic glands in the neighbourhood of the bifurcation of the trachea were affected with this morbid change to such an extent as to cause fatal suffocation. In the internal iliac glands it is not uncommon, so as to form large indurated masses, and in the female may operate as a cause of difficult parturition, equally fatal to the mother and the child.‡

Hypertrophy of the thyroid.—Hypertrophy of the thyroid constitutes the disease known by the name of goitre or bronchocele, which is endemic in certain countries, and is generally supposed to depend on certain conditions of the air and water. (See BRONCHOCELE.)

Hypertrophy of the thymus.—It is by no means uncommon to find the *thymus* preternaturally developed in scrofulous or rachitic children. We have seen it so large in some cases as to cause an evident projection of the sternum.

Hypertrophy of the mammary glands.—The mammary glands are sometimes enormously developed. Dr. Joerdens relates an instance in which they grew to such a size as to reach down to the thighs.§

Enlargement of the prostate arising from an increased development of its natural structure is by no means uncommon at an advanced period of life: this affection may involve the

* Morbid Anatomy.

† Andral.

‡ Anatomy of the Absorbing Vessels.

§ Hufeland's Journal.

* Andral, op. cit.

entire gland, or may be confined to one of its sides, or to its middle lobe. Hypertrophy of the prostate causes considerable difficulty in voiding the urine by mechanically obstructing the neck of the bladder; it likewise occasions a difficulty in passing the fæces by its pressure on the rectum.

From the brief sketch we have drawn of some of the most remarkable effects of hypertrophy on the several tissues and organs in which it has been observed, it appears that this affection is one of extremely frequent occurrence, and productive of a great variety of morbid appearances which pathologists have only recently learned to refer to their true source.

If, from the consideration of the physical characters of this affection, we turn to the investigation of its immediate or proximate cause, we find that it consists in an excessive activity of the natural function of nutrition. In order to describe the mechanism of this excessive nutrition, it will be necessary to premise a few observations on the mode in which this process is accomplished in the natural or healthy state. The process of nutrition essentially consists in the several solids alternately receiving from and returning to the common nutritive fluid, the blood, a succession of particles similar to those of which their structure is naturally composed. The appropriation of the new particles is termed assimilation, and the detachment and removal of the old particles is known by the name of de-assimilation, or of interstitial absorption. Various opinions have been entertained by pathologists respecting the mechanism by which these changes are accomplished. According to Bichat, each organic tissue is supposed to have its appropriate exhalant arteries, from which it derives the materials requisite for its nutrition; these exhalents he supposes endowed with a peculiar sensibility, by virtue of which they are enabled to select from the blood and convey to their destination those precise ingredients which are fitted for the building up of the tissue or organ they supply: for example, he supposes that the bones possess a set of exhalant actions, which convey nothing but the calcareous phosphates; that the muscles have likewise a set of exhalents that convey only fibrine; and that there are likewise a particular set of nutritive exhalents for conveying albumen, gelatine, &c.: he likewise supposes the existence of a separate set of vessels for the removal of each of these substances. The existence of such a series of vessels has, however, never been demonstrated by dissection, and it is now generally believed that the elements of all the secretions are contained in the blood; that this fluid, holding all the different elements in solution, is conveyed by the capillary circulation to the intimate structure of the different solids, and that it is only by the plastic force inherent in the solids themselves that these elements are separated and applied to their destined purposes. According to this view of the subject, it is the several tissues themselves and the molecules of which they are composed that select their constituent in-

gredients from the blood, and appropriate them to their construction and support; and the power of assimilation is shared by every particle of every living solid in the body. This faculty of assimilation is compared by Lobstein to the action of a crystal, which when plunged in a saline solution attracts towards itself and promotes the crystallization of those saline particles homogeneous to itself, which were suspended in the fluid; so in like manner he conceives the organic molecule selects from the blood those elements which are homogeneous to it.*

In hypertrophy this assimilation or plastic force is preternaturally increased, and the consequence is that an excessive quantity of nutritious particles are assimilated, and the tissue or organ affected is over-nourished, that is, hypertrophied. Andral supposes that the same effect may be produced by a defect in the activity of the de-assimilating powers; that the absorbents do not carry away the materials they ought; and that in this way an accumulation of nutritious particles takes place independently of any increase in the assimilating powers of the part; and he adduces, in support of this hypothesis, the well known fact, that hypertrophies which have been combated in vain by bloodletting and emollient applications, often yield to the use of stimulants, such as iodine, mercury, &c. Again, the production of this alteration of structure has been by many pathologists attributed to an increased afflux of blood towards the part affected. This increased local determination of blood may readily be conceived to perform a very important part in the production of hypertrophy, but cannot be considered as its sole, or even as its most efficient cause; for it is evident that the increased determination of blood to an organ can of itself only produce the congestion of that organ, but can never cause its hypertrophy unless when aided by a corresponding increase in the assimilating powers of the part; and if we admit an increase of those powers, the other condition becomes unnecessary, for the increased powers of assimilation, by their more active appropriation of the nutritive particles contained in the ordinary supply of blood, are sufficient to produce the preternatural growth of hypertrophy of the heart, independently of any increase of the quantity of the nutritive fluid.†

Lastly, hypertrophy has been described by some authors as having an inflammatory origin; but this etiology of the affection, though correct in many instances, is inapplicable to many cases of excessive nutrition. In those unhealthy districts of the Alps, for instance, where bronchocele exists as an endemic disease, the individuals affected are for the most part sickly, pale, and exanguinous; there is no evidence in them of any inflammatory actions, either present or antecedent, and yet not only the thyroid, but the liver, the tongue, and the bones are often hypertrophied to an extreme

* *Traité d'Anatomie Pathologique.*

† *Andral, op. cit.*

degree in these cases: so also in scrofula and rachitis, the mesenteric glands, the upper lip, and the ends of the bones are often considerably enlarged, and yet such persons are not instances of increased vigour or of the inflammatory diathesis.

It is true that in many cases the first phenomenon which presents itself to our notice in the part where hypertrophy is subsequently to take place, is a degree of local irritation, attended with more or less of sanguineous congestion; but there are also many cases besides those we have specified where no symptoms of any such antecedent irritation can be observed. Indeed, as M. Andral remarks, its existence cannot always be fairly admitted either from analogy or induction; and even when present, it can only be regarded as giving rise to some derangement in the process of nutrition, but is altogether inadequate to account for the peculiar character of the alteration which ensues. In theory we have no reason to suppose that the hypertrophy or increased nutrition of an organ is necessarily preceded by inflammation, and in point of fact we ought not to admit a necessary connexion between these two orders of phenomena, since in many cases we find them existing singly, without the slightest proof of having been preceded or accompanied by the other.

In the present state of our pathological knowledge, it is perhaps premature to speculate on the proximate cause of hypertrophy, or to found our treatment exclusively on either of these theories: until we know how the process of nutrition is accomplished in health, it is idle to theorize on its accomplishment in disease. If we cannot comprehend how muscle or bone are formed from the blood in their due proportion, it need be no matter of surprise that we cannot explain how these substances are occasionally formed in excessive quantities. But though we cannot scrutinize the first causes of these processes, we may nevertheless observe the influence of circumstances in modifying their results, even though we cannot in all cases comprehend the precise mode of their operation. Thus, we learn from observation that the extirpation of the testes in the male, or of the ovaries in the female, has a marked tendency to produce an excessive development of the adipose tissue; in like manner we learn that a residence in certain countries causes hypertrophy of the thyroid; that syphilis produces nodes and exostoses; rachitis, enlargement of the ends of the bones; scrofula, of the lymphatic ganglions, &c.; and that irritation of the mucous membrane of the colon produces hypertrophy of the subjacent layer of cellular tissue, although the *modus operandi* of these causes is by no means equally obvious.

We would, therefore, recommend that the treatment of this affection should not be founded exclusively on either of the theories that have been formed respecting its proximate cause, but that the existence of hypertrophy being once ascertained, we should endeavour to discover, *experimentally*, what are the most efficient means of combating and subduing it.

By adopting this method of proceeding, iodine has been discovered to possess the power of dissipating hypertrophy of the thyroid, and mercury has been proved a no less powerful agent in removing certain forms of exostoses.*

The *exciting causes* of hypertrophy, so far as we are acquainted with them, may be divided into those which act through the medium of the constitution, and those which act locally. To the first class may be referred,—

1. That condition of climate or soil which renders bronchocele and cretinism endemic in certain districts of the globe. (See BRONCHOCLE.)

2. A peculiar idiosyncrasy or predisposition to the excessive development of the solids generally, or of certain tissues or organs in particular. This state of the constitution is remarkably exemplified in the disposition which certain individuals evince to accumulate fat under circumstances where others would almost die of inanition, as in the remarkable case of obesity related in a preceding part of this article. A still more remarkable case of general hypertrophy is recorded in the first volume of the *Journal Hebdomadaire*, p. 76. The individual was a strong healthy country girl, until, at the age of 18, the menstrual discharge ceased suddenly after exposure to a violent storm, and from that time she became subject to headach, numbness of the limbs, and shortness of breathing: these symptoms were attended with a gradual and progressive hypertrophy of her muscular, cutaneous, cellular, and adipose tissues, until at the end of eleven years after the suppression she presented the following appearances. Her height remained unaltered (five feet two inches); the skull was of the ordinary dimensions, but appeared exceedingly small in comparison to the face, which was enormously developed; the skin of the forehead, the eyelids; and eyebrows, nose, lips, cheeks, and chin, were of such a monstrous size as to suggest the idea of a mask meant for a giant at least eight feet in height. The tongue was so large as to fill the mouth almost completely; the neck could only be compared to that of the Farnese Hercules. The mammae were of an enormous size, and reached almost to the chin. The circumference of the trunk was equal to the height of the individual, but this prodigious size was not caused by the excessive accumulation of fat alone, as the muscles were every where largely developed, and appeared perfectly defined under the skin. The upper and lower extremities seemed disproportionately short on account of their enormous bulk, and the hands are represented to have been quite a curiosity for their size. The heart was hypertrophied in the same proportion as the other parts of the muscular system, and at each contraction struck the chest with such violence as to give the ear, when applied over it, a very smart blow. The brain likewise participated in the affection, and its faculties gradually merged into a state of idiocy. In this case, though the origin of the excess of nutrition may be traced to the sup-

* Andral, *op. cit.*

pression of the menstrual discharge, it is impossible to refuse admitting an idiosyncrasy on the part of the individual, as suppression of the catamenia is not necessary or even generally followed by any such alteration in the nutrition of the solids.

3. Syphilis and the abuse of mercury, which are known to produce hypertrophy of the osseous system in the form of nodes and exostoses.

4. Scrofula and rachitis, which have been observed to cause enlargement of the thymus, lips, and tongue, of the lymphatic and mesenteric ganglions, and of several parts of the osseous system, especially the ends of the long bones.

5. Full living and sedentary inactive habits, which usually dispose to excessive development of the adipose tissue.

Such are the principal general or constitutional causes of hypertrophy which observation has pointed out; but it must be confessed that the enumeration is by no means complete, and that the subject requires further investigation.

Among the principal local causes of hypertrophy may be enumerated the following:—

1. Irritation or inflammation, especially when it assumes a chronic character. We have already stated that this is by far the most frequent cause of hypertrophy. On referring to the descriptions we have given of this affection, it will be found that in a great majority of cases hypertrophy of the mucous, cutaneous, and cellular, as well as of the fibrous and osseous tissues, may be referred to this source. In such cases the hypertrophy is sometimes confined to the tissue which was previously in a state of irritation, while sometimes, after the tissue originally affected has returned to its natural healthy condition, the adjacent tissues retain a chronic form of disease, and fall into a state of hypertrophy.

2. Increased exercise of the functions of the affected organs. The agency of this cause in producing hypertrophy is most evident in the muscular and glandular system. It has been observed that persons who have lost the use of one arm or leg generally acquire an extraordinary degree of strength in the other, from the increased use that is made of it. In like manner, when one of the double organs, such as the kidneys or lungs, is rendered incapable of performing its functions with effect, the other, having double duty to perform, acquires a proportionate increase of development. Examples of hypertrophy of the muscular structure of the heart, bronchi, stomach, intestines, and bladder, arising from increased exercise of the fibres, have already been adduced.

Treatment of hypertrophy.—For all that is practically important respecting the treatment of hypertrophy, we must refer to the different articles in which the various species are noticed individually. We shall here content ourselves with a few general observations.

In the treatment of hypertrophy the first and most obvious indication is to remove, if possible, the exciting cause of the disease, as until that object is accomplished, our treatment can at best be but palliative, and in general, when the

cause which originally produced the hypertrophy is removed, the nutrition of the organ promptly returns to its natural standard: “*ab lata causa, tollitur effectus.*” As the alteration of nutrition is in most cases preceded or accompanied by evident symptoms of increased vascular action, the usual remedies for inflammation, viz., venesection, strict antiphlogistic regimen and perfect rest, are those most generally indicated; but we must not suppose that these remedies are equally applicable in every case, as the state of the constitution, and the circumstances under which the hypertrophy occurs, sometimes indicate a different or even opposite mode of treatment. When, for instance, the affection arises from scrofula, rachitis, or the residence in a country of cretins, the antiphlogistic regimen would only serve to aggravate the disease, and pure air and generous diet become in such cases the most valuable remedies. So, in like manner, when hypertrophy of one of the lungs or kidneys arises from increased action that is thrown on it by its fellow being incapacitated for performing its functions with effect, the diminution of its increased action, either by the exhibition of appropriate remedies, or, more effectually still, by restoring its fellow to the due discharge of its functions, will be found more efficacious in reducing the nutrition of the hypertrophied organ to its healthy standard than the most active depletory treatment. Again, it would be in vain to attempt combating by general or topical depletion the hypertrophied condition of the walls of the bladder so long as the presence of calculi in its interior kept up the irritation of its mucous membrane, and thereby maintained its muscular fibres in a state of frequent and violent action; for by such treatment we do not remove the cause of the disease, but only palliate its effects. Even this, however, becomes an object of considerable importance to the practitioner, when the cause of the hypertrophy is of such a nature as to baffle our attempts at its removal; as, for instance, in hypertrophy of the heart arising from organic disease of the valves.

There are but few medicines with which we are acquainted that possess any specific controul over this affection; of these the most effectual are iodine and mercury. The former has been found a specific in bronchocele, and has occasionally succeeded in dissipating enlargements of the lymphatic glands; and mercury has been found highly serviceable in removing enlargements of the bones, especially when proceeding from a syphilitic taint. When the hypertrophy arises from any of the constitutional causes we have enumerated, the treatment should be directed to the removal of that morbid state of the system on which it depends, and of which it is merely a symptom, and the tonic or antiphlogistic regimen prescribed according as the system requires to be invigorated or reduced. So, likewise, with respect to the topical treatment of this affection: when the part affected admits of such, the applications must be varied according as it exhibits excessive or deficient vascular action: in the first case

local abstraction of blood, fomentation and cataplasms may be applied, while in the second case stimulating applications and blisters will occasionally be found serviceable. It is impossible, therefore, to lay down any general plan of treatment universally applicable; each form of the disease must be treated with reference to its exciting cause, and more as the effect of a pre-existing disease than as a specific affection. In a general pathological article like the present, it would be foreign to our purpose to enter into a detailed account of the appropriate treatment of all the varied forms and different varieties of hypertrophy.

(R. Townsend.)

HYPERTROPHY OF THE HEART.—

In this article we purpose to develop, with as much brevity as the importance of the subject will allow, many of the leading principles common to organic diseases of the heart in general.

Hypertrophy of the heart is an augmentation of its muscular substance, resulting from increased nutrition. The terms *active* and *passive aneurism of the heart* we discard as vague and inaccurate, and adopt the following classification and nomenclature.

1. *Simple hypertrophy*, in which the walls are thickened, the cavity retaining its natural dimensions.

2. *Hypertrophy with dilatation*. This, the eccentric or aneurismal hypertrophy of Bertin, presents two varieties: viz.—

a. With the walls thickened and the cavity dilated.

b. With the walls of natural thickness and the cavity dilated: i. e. *hypertrophy by increased extent of the walls*.

3. *Hypertrophy with contraction*. In this, the concentric hypertrophy of Bertin, the walls are thickened and the cavity is diminished. This classification is no less convenient than conformable to nature. The form of the second variety was not known to Laennec, though it was to Bertin. That it *really* consists of an augmentation of muscular substance, and therefore constitutes hypertrophy, is too manifest to require comment; but a further proof than mere structure affords is that it sometimes produces the symptoms of hypertrophy,—a fact which the writer ascertained and made known several years ago, before he had any knowledge that M. Bertin had done the same.*

The terms “eccentric or aneurismal” and “concentric” are not so simple and expressive as hypertrophy with dilatation, introduced by Laennec, and its natural converse, hypertrophy with contraction. There is a further objection to the nomenclature of Bertin. His first variety of dilatation, identical in its nature with his second variety of hypertrophy, is designated by a totally different name, viz. *active aneurism* (Bertin, p. 376), which could scarcely fail to lead the inexperienced student into the erroneous idea that there was a difference in the nature of the two affections. Now the only

difference consists in degree—in a predominance of the one state over the other. The terms, therefore, should be such as distinctly to imply identity in nature, and difference in degree only; and this is done in the simplest manner by giving precedence to the word hypertrophy, or dilatation, according as the one affection or the other predominates. Thus hypertrophy with dilatation denotes a predominance of hypertrophy, while the converse, dilatation with thickening (see DILATATION), denotes a predominance of dilatation. Hypertrophy by increased extent (without altered thickness) of the walls,—the form *b.* of the second variety,—is thus designated when it is accompanied with the symptoms of hypertrophy; but it is called simple dilatation when the symptoms are those of dilatation.

We have thought it necessary to speak thus particularly on the subject of nomenclature, as up to the present moment it has created much confusion, and must continue to do so until the terms active and passive aneurism are forgotten.

Anatomical characters of hypertrophy of the heart.—Before describing the anatomical characters of hypertrophy of the heart, it is necessary to give the reader an idea of the natural dimensions of the organ. Unfortunately, it is impossible to determine these exactly; for as they vary according to age, sex, and other circumstances, there is no immutable standard of comparison which might serve as a criterion. It is only by the eye, therefore, (and an experienced eye is necessary for the purpose,) that it can be determined whether the proportion of the heart to the system, and of its several parts to each other, is natural. The proportions assigned by Laennec approach perhaps as near the truth as it is possible to arrive: they are as follows. “The heart, comprising the auricles, ought to have a size equal to, a little less, or a very little larger than the fist of the subject. The walls of the left ventricle ought to have a thickness a little more than double that of the walls of the right: they ought not to collapse when an incision is made into the cavity. The right ventricle, a little larger than the left, and having larger columnæ carneæ, notwithstanding the inferior thickness of its walls, ought to collapse after an incision has been made into it. Reason indicates and observation proves that in a sound and well built subject the four cavities of the heart are, within very little, equal to each other. But as the walls of the auricles are very thin, and those of the ventricles have considerable thickness, it results that the auricles form scarcely a third of the total volume of the organ, or the half of that of the ventricles.” In the fœtus and very young children, the thickness of the left ventricle does not exceed that of the right to the extent described. The right cavities are rather larger than the left, and this is not owing to sanguineous distention attendant on dissolution; for the disparity is found, though in a less degree, in animals destroyed by hemorrhage.

The muscular substance in hypertrophy is

* Vide an Essay by the writer in 1824, read to the Royal Med. Soc. Ed.

usually firmer and redder than natural. These characters, however, are not essential to the disease; and when they exist in a great degree, they constitute induration, a distinct affection, dependent, not on increased, but rather on altered nutrition of the part.

Hypertrophy may be confined to a single cavity, or it may affect several, and even the whole simultaneously; and sometimes one cavity is thickened while another is attenuated. The reasons of this will be explained when we come to treat of the exciting causes. When all the cavities are hypertrophous, and at the same time dilated, the heart attains a volume, two, three, and occasionally even four times greater than natural; its form, instead of being oblong, is spherical; its apex is scarcely distinguishable; and as the diaphragm does not retire sufficiently to yield space downwards for the enlarged organ, it assumes an unnaturally horizontal position, encroaching so far upon the left cavity of the chest, as sometimes to force the lung upwards as high as the level of the fourth rib, or even higher. When great enlargement is accompanied by adhesion of the pericardium, the organ is secured by the attachments of the membrane in a higher situation than its gravity would otherwise dispose it to assume; and being thus impacted between the spine and the anterior parietes of the chest, it is apt to occasion a preternatural prominence of the præcordial region. We are not aware that this remark has been made by any other writer, but we have seen the phenomenon in so many instances, that we are disposed to assume it as a general fact. (See PERICARDITIS.)

The left ventricle, being more prone to thickening, and not less to dilatation than the right, sometimes attains a volume seldom or never acquired by the right; and when its enlargement is enormous, it occupies not only the left præcordial region, but extends far under the sternum, where its impulse and sound may be mistaken for those of the right ventricle.*

The walls of the left ventricle, the natural thickness of which averages about half an inch in the adult, may be increased to the extent of one, one and a half, or, according to some, of two inches. The cases are rare in which it exceeds an inch and a quarter. The situation of the greatest thickening is usually a little above the middle of the ventricle, where the columnæ carneæ take their origin. Thence, the thickness decreases rather suddenly towards the aortic orifice, and gradually towards the apex, where it is reduced to less than half. When hypertrophy maintains these proportions in the different parts of the ventricle, the state is only an exaggeration of the natural form. The case is different when the hypertrophy takes place inwards and diminishes the cavity; for then the whole ventricle is nearly equally thickened, and it is usually globular and firm.

The columnæ carneæ generally participate in

hypertrophy, but sometimes, when there is much co-existent dilatation, they appear to be stretched, flattened, and attenuated. The inter-ventricular septum, though belonging almost entirely to the left ventricle, is commonly less thickened than the external walls of this cavity. When the left ventricle is greatly enlarged, the right, if unchanged, is applied in a flattened form to its superior and lateral part, and by contrast looks singularly small. But if, as generally happens, the right is elongated, it is, as it were, folded around the left.

When the right ventricle alone is hypertrophous, it may descend lower than the left, and constitute the apex of the heart. Its columnæ carneæ, naturally more numerous and interwoven than those of the left, are more susceptible of thickening than the walls themselves. Hence the increased size of the columnæ is commonly the first object that arrests the attention, and to them alone is the hypertrophy in many instances confined. They are sometimes so curiously interlaced and attached as to traverse the ventricle in every direction, subdivide it into various compartments, and in some cases almost totally to fill up its cavity: (as in case 89 by Bertin, and that of Collins, p. 469 of Treatise of Dr. Hope.) These changes never take place to the same extent in the left ventricle. The total thickness of the walls of the right ventricle, naturally averaging three lines, rarely exceeds four or five; yet it has been known to attain from eleven to sixteen, as appears from the 88th case of Bertin, and one, by Soins, in the *Archives de Médecine*. In a girl of nine years old we have met with it measuring six or seven lines, which is equal in proportion to nearly double that extent in the adult. Hypertrophy without dilatation is much more rare in the right than in the left ventricle. The greatest thickening of the right ventricle is near its base; towards the apex, though the columnæ carneæ be enlarged, their interstices are usually thin, and not unfrequently translucent.

Hypertrophy may not only be confined to a single ventricle, whether the right or the left, but it may be limited to particular parts only, as the base, the septum, the apex, the columnæ carneæ, or the external walls; the remainder of the cavity being either natural or attenuated. Again, a thickened ventricle may be contracted in one part, while it is dilated in another. In examining the dead subject in mixed cases, it is necessary to counterpoise the opposite conditions, to balance the hypertrophy against the attenuation, and the dilatation against the contraction, in order to determine which is the predominant affection.

The hypertrophy of the auricles is almost invariably of the second species, or that with dilatation. Laennec even states that he has never met with any other.* The simple and the contracted forms, however, are not without example. The thickening is diffused in a very uniform manner throughout the cavities, the muscoli pectinati being the only parts in which

* Laennec, tom ii. p. 507. Treatise on Dis. of Heart, by Dr. Hope: case of Lambert.

* De l'Auscult. tom. ii. p. 524.

it is more considerable than elsewhere; and as they are larger and more numerous in the right than in the left auricle, it is in the former that hypertrophy proceeds to the greatest extent. It occasionally renders the auricle nearly as thick as the right ventricle. This we have never known to take place in the left auricle. Sometimes the muscoli pectinati are the only parts in which hypertrophy shows itself. The thickening of the auricular walls seldom exceeds double the natural state, and being even then inconsiderable, it may easily be overlooked by an inexperienced eye. When it amounts to a quarter of an inch, which is rarely the case, it is very perceptible.

Mode of formation and predisposing causes of hypertrophy.—Hypertrophy takes place in the heart by the same process as in any other muscle. Increased action causes an augmented afflux of blood, and there results a corresponding increase of nutrition. Diminished action, on the contrary, has the reverse effect. Thus, the arms of the smith and the legs of the dancer are usually robust; while limbs paralysed or not exercised are pale and emaciated. If, however, the circulation can be re-invigorated in the palsied part, nutrition is increased.

In the same way, when from mechanical obstruction or any other cause blood is inordinately accumulated in the heart,—short, however, of that degree which would paralyse its remittent power—the organ is provoked to extraordinary efforts; it struggles against the obstacle; it frets and labours to overcome it; the coronary arteries are excited to increased activity; augmented nutrition ensues; the parietes are thickened, the muscular power is increased; the effects, superadded to the cause, induce a still greater violence of action; and thus the disease is not only established, but has a constant tendency to increase.

The left ventricle is much more prone to hypertrophy than the right; and the right, again, than the auricles. This admits of explanation on very simple principles. It is found that hollow muscles resist over-distention by their contents with a force exactly proportionate to their strength. Thus, if we suppose two cavities, one twice the strength of the other, and add to the natural pressure on those cavities such a surplus as will exactly overpower the weaker, this surplus will bring into action only one half of the supplementary strength of the more vigorous. Now, as the act of resistance, by stimulating the arteries to increased action, is the cause of increased nutrition, it follows that stronger muscles must be the more susceptible of hypertrophy. Accordingly, on referring to the heart, we find that the relative structure of its several compartments is such as to predispose the organ to those changes which it actually undergoes from over-distention. The left ventricle, being charged with the immense burden of the greater circulation, is proportionably substantial and robust; the right, having the comparatively light task of propelling the blood through the minor or

pulmonary system, is little more than one-third as thick and powerful as the left: the auricles, again, having a still less laborious function to perform, have a still more limited muscular provision. Hence, it is easily understood how a given increase of distending force, sufficient to overcome the contractile and elastic power of the right ventricle, might operate merely as a stimulus to the superior muscularity of the left. While the former, therefore, incapable of reacting on its contents, would dilate, the latter, excited to extraordinary efforts, would become hypertrophous.

It is not however to be supposed, that while the left ventricle is becoming hypertrophous, it may not at the same time undergo dilatation; nor, on the other hand, that the right ventricle, while yielding to dilatation, may not become hypertrophous; for observation teaches us that the combination of hypertrophy with dilatation, either in the left ventricle alone, or in the two conjointly, is the most ordinary form of organic disease of the heart.

For an explanation of the cause why dilatation accompanies hypertrophy, the reader may refer to the article on DILATATION. Why hypertrophy sometimes accompanies dilatation of the right ventricle may be here explained, and it admits of an explanation in one or other of two ways. 1. It has been remarked by Laennec (*Traité*, tom. ii. p. 496,) that a large proportion of mankind are born with ill proportioned hearts, the parietes being a little too thin or a little too thick on one or both sides. Now when this abnormal thickness exists in the right ventricle, it is clear, from what has been said above, that it must impart to that ventricle an increased disposition to hypertrophy. This explanation, however, is not satisfactory, as the existence of the malformation described by Laennec cannot be positively proved: still, as all the other organs and parts of the body are liable to defects of natural conformation, it is consistent with analogy to suppose that the heart may be liable to them also.

2. As augmented nutrition is excited in the left ventricle by stimulating it in proportion to and not beyond its power, so a stimulus bearing the same proportion to the power of the right ventricle, must have the same effect on it also. Accordingly, in the majority of cases of hypertrophy of the right ventricle, an obstacle is found to exist of such a nature as to stimulate it in the manner described. The obstacles which we have most frequently found to produce the effect, are, contraction of the mitral valve operating in a retrograde direction through the lungs, and that of the semilunar valves of the pulmonary artery. These affections being usually slight at their commencement and slow in their progress, oppose an obstacle to the circulation not only moderate in degree, but constant in its operation,—the two circumstances best calculated to induce hypertrophy of the right ventricle.

M. Bertin conceives that the greater tendency of the left ventricle than of the right to hypertrophy, depends upon the more stimulant quality of the arterial blood circulating through

the former. This opinion he founds on the circumstance that hypertrophy of the right ventricle in most cases accompanies patescence of the foramen ovale, which lesion he thinks causes an influx of arterial blood into the right ventricle. But, admitting that arterial blood in the right ventricle does occasion hypertrophy, it does not follow that it should have the same effect on the left; for of the former ventricle it is a morbid stimulus, but of the latter it is the natural one. Accordingly, direct proof is to be found in the auricles, that arterial blood is not the cause of hypertrophy; for the left auricle, which on M. Bertin's principle ought to be more subject to hypertrophy than the right, is less so. It will be shown, moreover, in the article on malformations of the heart, that, in the cases on which M. Bertin founds his opinion, the blood does not enter the right ventricle.

Exciting causes.—According to the foregoing opinions on the mode of formation of hypertrophy, it will be apparent that every circumstance capable of increasing the action of the heart for a sufficient length of time,—a period which must be very considerable,—may be a cause of hypertrophy. These circumstances may be either, 1. of a nervous, or 2. of a mechanical nature. 1. The former class comprises all moral affections and all derangements of the nervous function that excite long continued palpitation. To these we would add protracted rheumatic fevers; for we have known these give rise to hypertrophy, though there was apparently no inflammation of the heart or its membranes. 2. The latter class embraces all physical causes which can either *accelerate* or *obstruct* the circulation, and thus occasion a preternatural pressure of the blood upon the heart. The physical causes which *accelerate* the circulation, are, violent and protracted corporeal efforts of every description. In growing youths, excessive rowing is one of the most efficient. We have met with several in which it has produced the effect. The physical causes which *obstruct* the circulation are very numerous. They comprise smallness of the aorta, whether congenital or acquired; dilatation of the aorta; inequalities of its internal surface; all diseases of the valves of the heart which either contract their apertures or impede their movements; adhesion of the pericardium; all affections of the chest that obstruct the circulation through the lungs, as peripneumony, acute or chronic; empyema; hydrothorax; chronic catarrh; emphysema; phthisis,* narrowness of the chest, either con-

genital, or occasioned by curvature* of the spine, &c.; encroachment of the diaphragm on the cavity of the chest from the pressure of tight stays, of the gravid uterus, of abdominal dropsy, aneurism, &c.

In reference both to the nervous and the physical causes of palpitation, it may be said that young persons of a plethoric habit and sanguine temperament are the most susceptible of their influence. Hence it is that very stout and high-coloured females, from the age of seventeen to twenty-five, are peculiarly subject to hypertrophy. We have noticed this fact more especially in servants coming to London from the country.

Order of succession in which the several compartments of the heart are rendered hypertrophous by an obstacle before them in the course of the circulation.—As an obstacle to the circulation operates on the heart in a retrograde direction, the cavity situated immediately behind it is the first to suffer from its influence. Accordingly all the impediments seated in the aorta, its mouth, or the arterial system, act primarily on the left ventricle, which, being likewise exposed to the heaviest burden when the circulation is accelerated, has to conflict against a greater variety of exciting causes of hypertrophy than any other cavity of the heart. On this account, therefore, as well as from the thickness of its parietes, it is subject to hypertrophy in a greater degree than any other.

So long as the left ventricle is capable of propelling its contents, the corresponding auricle, being protected by its valve, remains secure. Hence, in a large majority of cases, the auricle is perfectly exempt from disease, while the ventricle is even enormously thickened and dilated. But when the distending pressure of the blood preponderates over the power of the ventricle, its contents, not being duly expelled, constitute an obstacle to the transmission of the auricular blood. Hence the auricle becomes over-distended, and the obstruction may be propagated backwards through the lungs to the right side of the heart, and there occasion the same series of phenomena. When the obstruction thus becomes universal, as is frequently the case, it may happen either that all the cavities are thickened, or those only which from their conformation have the greatest predisposition to it.

When the mitral orifice is contracted, especially if the aperture be very small, the left ventricle, being insufficiently supplied with blood, is not stimulated to its ordinary contractile action, and consequently becomes emaciated and occasionally flaccid or softened. Meanwhile, the left auricle, having to struggle against the contracted valve in front, and also to sustain the distending pressure of the blood flowing in from the lungs, invariably becomes thickened and dilated. The engorgement, extending backwards through the lungs to the right ventricle, occasions its hypertrophy and

* We have not found that phthisis is so decided a cause of disease of the heart as we should be led to suppose from the extreme pulmonary obstruction to which it sometimes gives rise. The reason of this appears to be, that, in the early stages, when the disorganization is not extensive, the circulation is little embarrassed; and in the advanced stages, the mass of circulating fluids is so much diminished in consequence of deficient nutrition and augmented cutaneous transpiration, that the heart sustains little additional burden from the obstruction in the lungs. In most cases, however, the right ventricle is found somewhat dilated,—a remark which has been made more especially by M. Louis and Dr. Williams.

* The majority of hump-backed persons are ultimately attacked by disease of the heart.

dilatation; under which circumstances, namely, hypertrophy of the right ventricle and contraction of the mitral valve, the lungs suffer in a pre-eminent degree; for being exposed to the augmented impulsive power of the right ventricle behind, and incapable of unloading themselves on account of the straitened orifice in front, their delicate and ill-supported vessels are strained beyond the power of resistance. If, therefore, they cannot disgorge themselves sufficiently by a copious secretion of watery mucus, they effuse blood by transudation into the air-vesicles and tubes, and form the disease denominated *pulmonary apoplexy*. We have found this affection to occur more frequently under the circumstances described than under any other.

When the mitral orifice is permanently patulous, so that, at each ventricular contraction, blood regurgitates into the auricle, this cavity suffers in a remarkable degree; for it is not only gorged with the blood which it cannot transmit, but, in addition, sustains the pressure of the ventricular contraction. Permanent patulency of the mitral orifice, therefore, constitutes an obstruction on the left side of the heart, and the effect of this, as of contraction of the orifice, may be propagated backwards to the right side.

When the impediment to the circulation is primitively seated in the lungs, the right ventricle, situated immediately behind them, is the first to experience its influence; and when the cavity is so far overpowered by the distending pressure of the blood as to be incapable of adequately expelling its contents, the obstruction extends to the auricle; the process being exactly the same as that already described in reference to the left ventricle and auricle.

Obstruction in the right auricle, whether from this or any other cause, presents an obstacle to the return of the venous blood, and therefore ultimately causes retardation throughout the whole venous system. Nor is this all; for the retardation is propagated through the capillaries to the arterial system, and thus at length returns in a circle to the heart. In this way is explained what at first sight appears an anomaly; namely, that the left cavities are sometimes rendered hypertrophous by an obstruction situated behind them in the course of the circulation. The left ventricle, for instance, may be rendered hypertrophous by a contraction of the mitral orifice.

The reader must here be again reminded that the exciting causes of hypertrophy are equally those of dilatation; and that, supposing no unknown agencies to interfere, as may sometimes possibly happen, it depends on the proportion which the exciting cause bears to the reacting energy of the cavity exposed to its influence, whether that cavity become affected with hypertrophy, with dilatation, or with a combination of the two.

It may be said, generally, that when congestion is *constant* in a cavity, dilatation is more commonly the result; and that when there is only resistance to the expulsion of the blood, without constant engorgement of the

cavity, it is more common for hypertrophy to be produced. Contraction, for instance, of the aortic orifice causes hypertrophy of the left ventricle in a greater degree than dilatation; whereas patulency of that orifice, attended with regurgitation and constant engorgement of the cavity, causes dilatation in a greater degree than hypertrophy.

Hypertrophy with contraction most commonly proceeds from straitening of an orifice. Thus the greatest hypertrophy with contraction of the right ventricle upon record was accompanied with straitening of the pulmonary orifice to two lines and a half in diameter. (Case 87 by M. Bertin.) We have met with a very similar case; and several connected with malformation of the heart are on record.

It may be useful to subjoin a list of the various forms and combinations of hypertrophy and dilatation, and to shew the comparative frequency of their occurrence. On the latter point we shall offer the result of our own observation, and we believe that they correspond very closely with those of others.

The diseases are of more frequent occurrence in proportion as they are higher in the following scale.

1. Hypertrophy, with dilatation of the left ventricle, and a less degree of the same in the right.
2. Hypertrophy with dilatation of one ventricle, especially the left, with simple dilatation of the other.
3. Simple dilatation of both ventricles.
4. Simple hypertrophy of the left, and hypertrophy with dilatation of the right.
5. Dilatation with attenuation of the left.
6. Hypertrophy with contraction of the left.
7. Hypertrophy with contraction of the right.

Of the auricles.—1. Distention, particularly of the right, from congestion during the act of dissolution.

2. Dilatation with hypertrophy.

3. Simple hypertrophy.

4. Hypertrophy with contraction.

Pathological effects of hypertrophy, and mode of their production.—M. Laennec supposes the general symptoms of all organic diseases of the heart to be nearly the same.* It may be said without prejudice to one who has done so much, that, on this subject, both he and all the authors who preceded him have entertained inaccurate ideas. They had studied these diseases in the aspect under which they most commonly present themselves, namely, complicated one with another; and it is unquestionable that when so viewed, they display a general similarity in their symptoms. But it had never occurred to those authors to analyse each disease in an isolated form. When so examined, although certain symptoms are common to all, they severally manifest differences of a striking kind, obviously dependent on their respective organic peculiarities, and which may, therefore, be fairly regarded as the essential and diagnostic characters of each.

* De l'Auscult. tom. ii. p. 487.

M. Bertin has the merit of having been the first to display in a clear light the essential pathology of hypertrophy. His distinguished talent for generalization, however, has, we believe it will be allowed, carried him too far. He contends that authors are wrong in having assigned to hypertrophy or *active aneurism* as its symptoms, dyspnoea, suffocation, violet injection of the face, engorgement of the lips and of the venous capillaries in general, passive hemorrhages, and serous infiltration. He contends that these are the signs, not of hypertrophy, but of some co-existent lesion, as a contracted orifice or any other affection capable of obstructing the circulation; and that pure uncomplicated hypertrophy is characterised by signs of increased activity and energy of the circulation, instead of by dropsy and the other signs of retardation of the blood.

That this is true in reference to the *pure uncomplicated* form of the disease, before embarrassment of the capillary circulation has taken place, will not be denied by any one who has had opportunities of verifying the symptoms by dissection. But M. Bertin is not, in our opinion, supported by sound observation when he says that serous infiltration and the whole class of symptoms bespeaking an obstructed circulation, are totally foreign and repugnant to hypertrophy. The truth we believe to be, that the very same energy of the circulation which gives rise to active hemorrhages, apoplexy, &c., causes, as its next effect, engorgement of the arterial capillary system; the necessary consequence of which is serous infiltration, and more or less of all the other symptoms indicative of retardation of the blood.

M. Bertin is of opinion that the impediment to the respiration which attends enormous enlargement of the heart, results from the encroachment of the organ on the lungs. This, however, is disproved by the fact that tumours of a much larger size, as for instance, aneurisms of the aorta, malignant tumours, &c. have existed in the chest, even for years, without producing similar inconvenience.

The primary effect of universal obstruction of the lungs by engorgement resulting from hypertrophy of the heart, is, to produce oedema of their cellular tissue and dyspnoea. The secondary effect is, to gorge the right side of the heart, and thus impede the return of the venous blood from the system at large; which impediment co-operates with the increased energy of the arterial circulation in producing anasarca.

Hypertrophy, however, does not produce serous infiltration so readily and promptly as a direct, primary obstacle to the return of the venous blood,—a fact which admits of a rational and obvious explanation. When there is an obstacle to the return of the venous blood, suppose, for instance, contraction of the tricuspid orifice, two causes conspire to produce the capillary congestion; namely, the direct pressure of the arterial vis-a-tergo, and the retrograde pressure of the retarded venous

blood. But when the latter pressure does not exist, when the veins freely receive and transmit their natural proportion of blood, the force of the arterial circulation must be *very greatly* increased, before it can so far overcome the elasticity of the capillaries as to give rise to engorgement and infiltration.

This satisfactorily accounts for the difference in the history and character of infiltration as resulting, on the one hand, from pure hypertrophy, and on the other, from contraction of a valve or other primary obstacle to the circulation. In the former case, it appears late, is generally moderate in extent, and requires for its production an aggravated form of hypertrophy; in the latter case, it appears comparatively early, is more copious, and yields with less facility to remedies.

The same reasons that account for the tardy occurrence of dropsy in pure hypertrophy, account, likewise, for another characteristic of this malady when moderate in degree; namely, the slight and transitory nature of the attacks of dyspnoea. For if the quantity of blood impelled into the lungs by the right ventricle, and the force with which it is impelled, are not very excessive, the pulmonary veins are capable of relieving the engorgement almost as quickly as it takes place: consequently the hurry of the respiration subsides promptly after the removal of its exciting cause; in other words, as soon as the action of the heart becomes a little calm. The sum, then, of all that has been said, is, that pure hypertrophy gives rise to increased force and activity of the circulation, and that, when this force surmounts the natural tonic power of the capillaries, congestion, infiltration, and the other phenomena of an obstructed circulation, ensue.

To these principles an exception presents itself in hypertrophy with contraction, whenever the cavity of the ventricle is too small to be capable of transmitting the natural quantity of blood. In this case, supposing the left ventricle to be the one affected, the arterial circulation sustains a diminution of force and activity; and whether the one ventricle or the other be affected, the disease creates an obstruction tantamount to that produced by valvular contraction: on the same principles, therefore, it generates dropsy and the other phenomena of a retarded circulation.

The effects of hypertrophy of the left ventricle on the brain are so pre-eminently important, that it is necessary to advert particularly to this subject, for the purpose of bringing it prominently into view. Since the researches of the present day have demonstrated that even a slight thickening of the walls of the heart constitutes a morbid state, and have unfolded to view the connexion subsisting between that state and a train of symptoms formerly either wholly overlooked or attributed to other causes, instances of apoplexy supervening upon hypertrophy have been so frequently noticed, that the relation of the two as cause and effect is one of the best established doctrines of modern pathology. Eight or nine cases of suddenly fatal apoplexy, and numerous cases of palsy,

from hypertrophy, have, within a few years, fallen under our own observation. In the majority of them the patient exhibited what is commonly called the "apoplectic constitution;" that is, a robust conformation, a plethoric habit, and a florid complexion: in others these characters were absent; but the total number of the cases of apoplexy from hypertrophy is much greater than we have witnessed, during the same period, of apoplexy from causes independent of hypertrophy; whence we are led to believe, with MM. Richerand and Bertin, that hypertrophy forms a stronger predisposition to apoplexy than the apoplectic constitution itself; and that, in most instances, those persons who present the apoplectic constitution in conjunction with symptoms of increased determination to the head, are, at the same time, affected with hypertrophy.

Nor is it to apoplexy alone, but to cerebral inflammations and irritations of every description, and even to inflammatory action in general, that hypertrophy of the left ventricle gives a tendency. The history of individuals affected with it frequently presents a striking narrative of violent headaches, brain fevers, various inflammatory complaints, and states of great nervous irritability and excitation. As the ophthalmic artery is derived from the carotid within the cranium, the eye participates with the brain in the effects of hypertrophy, and is vascular, brilliant, and very prone to ophthalmia. The wasting away of the eye which Professor Testa has remarked as one of the effects of disease of the heart, is, with good reason, supposed by M. Bertin to be connected with ossification of the ophthalmic arteries, a frequent concomitant of hypertrophy of the left ventricle.

The shock of an hypertrophous left ventricle may to a certain extent be intercepted, and its effects on the brain counteracted, by contraction of the aortic orifice. A patient was under the care of Mr. Babington, at St. George's Hospital, Sept. 16, 1829, for a surgical complaint, in whom the walls of the left ventricle were an inch thick, without any change of the cavity; and the aortic and mitral orifices were respectively encircled by a ring of bone as thick as a writing quill. The two valves, though overspread with calcareous scales, were capable of discharging their functions. Notwithstanding this extraordinary state of disease, the patient had attained the age of eighty without manifesting symptoms of diseased heart sufficient to arrest his own attention or that of his medical attendants. His advanced age, indeed, proves that they could not have existed in any considerable degree. In this case, therefore, the valvular contraction appears to have been exactly sufficient to counteract the hypertrophy, and maintain the circulation in a state of equilibrium. The generality of authors, however, have greatly over-rated the power of contraction of the aortic orifice to counteract the effects of hypertrophy on the brain. They have supposed that a moderate and even a slight degree of contraction is sufficient for the purpose.

There can be no greater error; and it is one into which they could not have fallen, had they been aware that an inconsiderable degree of contraction has very little effect in diminishing the strength, tension, and regularity of the pulse, as is shewn in the article on valvular disease.

To have demonstrated the influence of hypertrophy of the left ventricle on the brain, is equivalent to having showed that of the right ventricle on the lungs. For, in the same way that the brain receives *directly* the shock of the blood which the left ventricle shoots into the aorta, so the lungs receive *immediately* the impulse communicated to the column of blood, which the right ventricle propels into the pulmonary artery. Consequently, when the walls of this ventricle are augmented in thickness and energy, they impart a corresponding activity to the pulmonary circulation, and sometimes overcome the tonic power of the vessels. Hence ensues hemorrhage, or what was called by Laennec pulmonary apoplexy, from its taking place by the same mechanism as apoplexy properly so called, in cases of hypertrophy of the left ventricle. The hemoptysis resulting from this cause consists of fluid, red blood, and is generally copious, sudden, and productive of febrile excitement of the circulation. It is, in short, an active, arterial hemorrhage, and essentially different from that passive species, hereafter to be described, which results from retardation of the blood in the venous capillaries of the lungs. (See PULMONARY APOPLEXY and HEMOPTYSIS.)

Diagnosis of hypertrophy.—The signs of hypertrophy are of two classes: 1. *general*; 2. *physical*. According to our experience, neither of these classes, taken separately, is sufficient to indicate any disease of the heart with perfect certainty: taken conjointly, they render the diagnosis so easy that a material error can scarcely be committed.

I. *GENERAL SIGNS.*—In describing these we shall follow the course of the circulation; commencing, after having noticed the action of the heart, with the circulation through the lungs, proceeding to that through the aortic system, and concluding with that through the veins.

The description of symptoms which we are about to offer, refers, it must be distinctly understood, to simple hypertrophy, unless when it is otherwise stated: the symptoms of *hypertrophy with dilatation*, which will be noticed in passing, are only an aggravated degree of the same—as the reader will sufficiently understand, if duly acquainted with the foregoing principles relative to the formation and effects of these diseases. When the dilatation predominates over the hypertrophy, the symptoms of course approximate more nearly to those of dilatation.* The symptoms of *hypertrophy with contraction* will also be noticed incidentally with those of simple hypertrophy.

Palpitation.—By this is to be understood a

* Vid. DILATATION OF THE HEART.

morbidly increased action of the heart, both as to strength and frequency. As the hypertrophous heart acts with an energy which, even in its tranquil state, verges on palpitation, and which, under the slightest excitement, actually amounts to it, the patient experiences this symptom more unintermittingly than in any other disease of the organ. It is induced by stimulants of any description: as muscular efforts, particularly that of ascending; mental emotion; flatulence; acidity or bile; spirituous or highly seasoned ingesta, and sometimes by a full meal of any kind. The violence of the attack generally subsides promptly after the operation of the exciting cause has been suspended, and little remains but a slight sense of pulsation in the præcordial region. In the advanced stage, however, of hypertrophy, and still more of this conjoined with dilatation, when the circulation has become embarrassed, the paroxysms are sometimes very severe and prolonged, though they never attain that fearful extreme of violence and obstinacy which is witnessed in cases complicated with valvular or aortic obstruction, or adhesion of the pericardium.

Dyspnœa.—While the enlargement of the heart is moderate, the patient, during a tranquil state of the circulation, feels little or no difficulty of respiration; but he is incapable of making the same corporeal efforts as other persons without losing breath: to use a common phrase, he is "short-winded." After a respite of a few minutes, however, he recovers, and is, therefore, seldom deterred by this symptom from prosecuting his accustomed avocations. We have frequently observed that individuals who pant on first setting out on a walk, are capable of sustaining great exertions without inconvenience when they get warm and the blood is freely determined to the surface. When the disease has proceeded so far as to occasion dropsy, more or less dyspnœa becomes habitual, and it sometimes occurs, conjoined with palpitation, in paroxysms of excessive severity. From this period, indeed, the symptoms are a compound of those of hypertrophy and those of an obstructed circulation, the latter of which are more particularly considered in the article DILATATION. Hypertrophy with contraction, as already stated, is sometimes accompanied with symptoms of an obstructed circulation.

Cough.—There is generally little or no cough in the early stages, but it always supervenes when dropsy appears, in connection with which more or less sanguineous and serous congestion almost invariably takes place in the lungs, and gives rise to the symptom in question. When the hypertrophy is confined to the left ventricle, the cough is milder and later in its appearance than when the right ventricle is affected. We have seen a dry, hacking and wheezing cough amongst the earliest symptoms in young and plethoric females, whom it attacks in paroxysms after any over-exertion, as ascending a stair. It is often also very troublesome on first rising in the morning.

Hemoptysis.—This may occur at any period of the disease, and the hemorrhage, being active

—the result of a too impetuous discharge of blood into the capillary system—is generally sudden and copious, consists of fluid arterial blood, and is attended with febrile excitement.

Pulse.—The pulse in hypertrophy of the left ventricle undergoes, from valvular and other lesions, a variety of modifications which disguise its real nature. It must, therefore, be studied in cases totally exempt from complication. In such it is almost invariably regular, and bears strict relations in strength and size to the thickness and capacity of the left ventricle. Thus, in simple hypertrophy it is stronger, fuller, and more tense than natural: it swells gradually and powerfully, expands largely, dwells long under the finger, and is sometimes accompanied with a thrill or vibration. These characters are still more marked in hypertrophy with dilatation, so long as the hypertrophy is predominant; but when the dilatation has proceeded so far as to diminish the contractile power of the muscular fibres, the pulse, though still full and sustained, is soft and compressible. In hypertrophy with contraction of the cavity, it is strong, hard, and tense, but small and cord-like, expanding little under the finger. The action of the carotids corresponds with that of the radials, and they may generally be seen to pulsate from the sternum to the angle of the jaw. In the temporals also a sense of throbbing is usually experienced.

Affections of the head.—The patient complains of a "rushing of blood to the head" on making any corporeal effort or stooping; of intense throbbing and lancinating headaches, aggravated by the recumbent position, and especially by the act either of suddenly lying down or rising up; he complains also of vertigo, tinnitus aurium, scintillations and other visual illusions; and sometimes of a lethargic somnolency, which so completely subdues the faculties both of the mind and the body, as utterly to incapacitate him for every species of exertion. These symptoms, if not relieved, terminate in palsy or apoplexy. From this catastrophe the patient is often preserved by the opportune occurrence of epistaxis, to which, happily, he is peculiarly liable. From the circulation in hypertrophy being active in the eye, this organ is bright and sparkling, and sometimes vascular or blood-shot.

Complexion.—The effect of hypertrophy is to heighten the colour so long as the capillary circulation continues unembarrassed, but afterwards to diminish and change it. Every individual, however, does not acquire a florid colour. Whether he acquire it or not, depends, in truth, upon the original complexion, the series of changes being different in those who are naturally florid, and those who are pale—a fact not generally known. In the former, the colour becomes remarkably vivid, and being generally accompanied with plethoric turgescence, it gives the aspect of health and good condition. But when the capillary circulation begins to labour, the red changes into a purplish patch on the cheeks, the nose and lips become more or less purple, violet, or livid, and the intermediate skin becomes sallow

and cachectic. In great hypertrophy with dilatation the purple and violet colours are sometimes of the deepest dye. In those who are naturally devoid of colour, hypertrophy either does not excite it at all, or merely increases in a slight degree the general vascularity of the face. This vanishes entirely when the capillaries become obstructed, and is superseded by universal cadaverous paleness, extending sometimes even to the lips. They, however, are generally somewhat livid.

Serous infiltration.—This, for reasons already assigned, seldom appears before the hypertrophy is very considerable or becomes conjoined with dilatation. It frequently shews itself first in the face; a circumstance attributable to the great number and size of the cerebral arteries, and to the force with which the blood is injected into them in consequence of their proximity to the heart. With the dropsy supervene, to a greater or less degree, all the other symptoms of an obstructed circulation.

Signs of hypertrophy of the right ventricle.—Hypertrophy of the right ventricle produces, according to Corvisart, a greater difficulty of respiration and a deeper colour of the face than is produced by the same affection in the left ventricle. Another sign is, the more frequent expectoration of pure arterial blood.

Turgescence of the external jugular veins accompanied by pulsation synchronous with that of the arteries, was pointed out by Lancisi as a sign of "aneurism," i. e. *hypertrophy with dilatation*, of the right ventricle; and we have rarely known it absent in this affection. Of such cases, therefore, we regard it as one of the best general signs. Venous pulsation is not, in our opinion, attributable to regurgitation through the tricuspid valve, as Bertin supposes; in substantiation of which opinion we may say that regurgitation would be attended with a bellows or other such sound: this sound, however, is not found to be a concomitant of jugular pulsation. Is the rationale of the phenomenon as follows? namely, as the ventricle, when hypertrophous, contracts with augmented power, the recoil of the tricuspid valve is preternaturally impetuous: hence, the column of blood in the act of descending into the ventricle is repelled with such an increase of force, that its impulse is propagated as far back as the jugular veins. This effect would be more considerable when the orifice and valve are enlarged, as is usually the case in hypertrophy with dilatation, because the quantity of fluid repelled would be greater. The effect would also be favored by congestion of the great veins, (a state which generally accompanies hypertrophy with dilatation of the right ventricle,) because, when congested, they are more tense unyielding tubes, and transmit an impulse more readily.

The jugular pulsation is double: a weaker pulsation precedes that occasioned by the ventricular systole. The weaker is occasioned by the auricular systole, and the mechanism of its formation we conceive to be this: at the time that the auricle contracts, the ventricle is in a state of moderate or natural fullness; it

therefore offers a certain degree of resistance to the ingress of more blood from the auricle; consequently, so much of the blood compressed by the auricular systole as cannot get forward into the ventricle, is forced back into the veins and causes their pulsation.

A difficulty has sometimes been experienced in distinguishing jugular pulsation from that of the carotid arteries; an error which may easily be avoided by observing that the jugular pulsation is confined to the lower part of the neck, and is far on the humeral side of the carotid. The pulsations of the artery, on the contrary, extend as high as the angle of the jaw, and in the direction of the anterior margin of the sterno-cleido mastoideus muscle.

The jugular turgescence, again, disappears in some degree during inspiration, and reappears on expiration; which movements, therefore, must not be confounded with the pulsations answering to the systole of the ventricle.

General signs of hypertrophy of the auricles.—There are none that are distinguishable from those of disease or obstruction in the corresponding ventricle or orifice, to which the hypertrophy of the auricles owes its origin. The detection of hypertrophy of the auricles is of little importance, the cause that produced it being the source of danger.

II. PHYSICAL SIGNS.—*Impulse.*—In simple hypertrophy, the impulse communicated by the stethoscope while the patient is in a calm state, is usually so strong as distinctly to raise the head of the observer, and sometimes even sufficient to produce a shock disagreeable to the ear. The greater the hypertrophy, the longer this heaving takes for its performance. When the malady exists in a great degree, we evidently perceive that the heaving takes place with a gradual progression; it seems as though the heart swelled and applied itself to the parietes of the chest, at first by a single point, then by its whole surface, and finally sank back in a sudden manner. This sinking back, which we have been in the habit of designating by the term *back-stroke*, is occasioned by the diastole of the ventricles, during which action the heart sinks back from the walls of the chest with a force greater in proportion to its thickness and capacity. Accordingly, the *back-stroke* is strongest in hypertrophy with dilatation, but it may also be very considerable in simple hypertrophy. In the healthy heart it is not perceptible, neither is it in dilatation without hypertrophy.

A strong, slowly heaving impulse, then, is the principal sign of simple hypertrophy; and the affection may be known to be greater when the impulse is followed by a back-stroke. Both these signs exist in hypertrophy with contraction, but in a less degree, and the back-stroke may be absent if the disease is not great.

In simple hypertrophy and that with contraction, the impulse is seldom perceptible much beyond the præcordial region, except during attacks of palpitation.

In hypertrophy with dilatation the signs are a compound of those of hypertrophy and those of dilatation. The contraction of the ventricles

can easily be felt by the hand applied to the præcordial region, and we find, especially during palpitation, smart, violent shocks, which strongly repel the hand. If we attentively examine the patient, even when most calm, we see that his head, his limbs, and even the bedclothes, are strongly shaken at each contraction of the heart. The pulsations of the carotids, the radials, and the other superficial arteries are often visible. The impulse of the heart can sometimes be distinctly felt under the clavicles and on the left side of the thorax; sometimes even in the back, especially in meagre subjects and children.

In hypertrophy with a predominance of dilatation, the pulse is ordinarily not considerable; but it becomes very marked during palpitation, especially if accompanied with fever, and it has a very different character from that occasioned by simple hypertrophy. The beats are strong, hard, and produce a shock analogous to the blow of a hammer; but the blow seems to strike a small space; it expends itself as it were on the thoracic parietes, and does not communicate to the head of the auscultator a heaving proportioned to its force: it differs, in short, from the impulse occasioned by great hypertrophy, in the circumstance that, in the latter, the ventricles in a distended state seem to heave with their whole length against the thoracic parietes, which yield to the effort; while, in the former case, the point only of the heart seems to strike the parietes with a sharp, smart, accurately circumscribed blow, only capable of producing a sort of concussion rather than a real heaving. The same species of impulse takes place in purely nervous palpitations, in reference to which we have called it *jerking*.

When the impulse is increased on one side only of the præcordial region, that is, under the inferior part of the sternum for the right side, and between the cartilages of the fifth and seventh left ribs for the left, we infer that the corresponding ventricle only is affected; and when it is increased on both sides, we conclude that both are affected, which is more commonly the case.

In hypertrophy, and hypertrophy with dilatation, independent of valvular disease, the beats of the heart even during palpitation are rarely irregular, unless when they become enfeebled by excessive dyspnoea or by failure of the vital powers on the approach of dissolution.

The impulse of the heart is diminished by loss of blood, diarrhoea, any exhausting disease, rigid and long continued abstinence, and, in general, by all the causes capable of producing debility. Consequently, a moderate hypertrophy might, without due care, be overlooked in a patient under any of these circumstances.

The impulse of the heart, moreover, may, even in cases of marked hypertrophy, cease entirely when there supervenes intense dyspnoea, connected with some affection of the lungs, especially peripneumony, pleurisy, œdema of the lungs, asthma, and the pulmonary congestions which form during the last moments of life. The sounds likewise diminish, or even entirely cease: no inferences, therefore, should

be drawn from an exploration made under such circumstances.

Sounds.—Hypertrophy has the effect of deadening the sounds of the heart. In simple hypertrophy, the first sound, i. e. that produced by the ventricular contraction, is duller and more prolonged than natural in proportion as the hypertrophy is more considerable, and it generally terminates in the second sound without any interval. When the hypertrophy exists in an extreme degree, the first sound becomes nearly and sometimes wholly extinct. The second sound, i. e. that produced by the ventricular diastole, is very brief and dull, and in extreme cases scarcely perceptible. The interval of repose is shorter than natural, in consequence of the first sound being longer. Both sounds are proportionably weaker when the ventricle is contracted as well as hypertrophous. In most cases of this description the sounds can scarcely be heard under the left clavicle and at the upper part of the sternum. Sometimes they cannot be heard farther than the impulse can be felt; that is to say, scarcely beyond the limits of the præcordial region.

Each sound of the heart, though essentially one, consists of the sounds of the two sides united. This is proved by a bellows murmur in the left præcordial region being audible in the right, and vice versâ. It does not follow, therefore, that because one ventricle is hypertrophous, the sound of the heart in general should be very limited in its range; for that of the other will be heard over an extent proportioned to its intensity, though not quite so far as when strengthened by its fellow. On the other hand, a morbidly increased sound of one ventricle, as by dilatation or a bellows-murmur, will be heard *alone* at points beyond the range of the natural sound of the other or healthy ventricle. Accordingly, it is only in hypertrophy of both ventricles that we must expect to find the sounds confined within very narrow limits.

We have not been able to verify the remark of Laennec, that “in hypertrophy, often when a strong heaving, without any first sound, is felt in the præcordial region, and the second sound can scarcely be distinguished, the latter is heard alone under the clavicles, and even on the back; and in less severe cases of this kind it is always heard more distinctly in these places than in the præcordial region, especially in meagre and narrow-chested persons.” We cannot understand on what principle it could be so, even supposing the auricular contraction were, as he imagines, the cause of the second sound; for as both the right auricle and ventricle are in immediate proximity and partly in contact with the sternum, it is inconceivable how the sound of either should be less distinct not an inch from its source than at a remote point. We have, however, found Laennec’s remark true when the sound was drowned in the præcordial region by a bellows-murmur or pulmonary râle; the explanation of which is, that the second sound, being of a more acute nature than the murmurs, is more readily transmitted to a distance.

On the same principle also, is to be ex-

plained another doctrine of Laennec, the accuracy of which we have frequently verified: namely, that "in healthy subjects, but in whom the heart has rather thin walls, the second sound is sometimes stronger under the clavicles than the first, although the same difference is not observable in the præcordial region." The reason of this is, that the second sound, being more acute, is more easily propagated.

In hypertrophy with dilatation the sounds are increased. The first is, as it were, a compound of the sound of dilatation and that of hypertrophy: namely, from dilatation it derives a loud, abrupt, or flapping commencement, and from hypertrophy a prolonged termination, like a respiratory murmur. The second sound, though not in general changed in its character, is louder than natural. These sounds may frequently be heard over the whole chest, both posteriorly and anteriorly, especially in children and meagre subjects.

In hypertrophy with dilatation the sound of the ventricular contraction is sometimes accompanied with a bellows murmur. This we have found to be almost always the case when the heart is extremely large and contracting with vehemence. The sounds of the heart, in every form of hypertrophy, may be diminished by the same causes that diminish the impulse.

Resonance* of the præcordial region on percussion is defective in simple hypertrophy, provided the heart be considerably enlarged; but, as hypertrophy and dilatation is the disease in which the organ attains the greatest volume, it is that in which resonance is most frequently and most extensively defective. In all cases of considerable enlargement the dulness as well as the impulse are lower down than natural, except in adhesion of the pericardium, by which affection the heart is more or less braced up.

Progress and termination of hypertrophy.—Hypertrophy, while moderate, and not complicated with any mechanical impediment to the circulation, is productive of very little inconvenience. This is especially true with respect to children. In them the heart is naturally larger in proportion than in adults; and in many this amounts to a very considerable degree of hypertrophy with dilatation, accompanied with greatly increased impulse and sound; yet the general symptoms manifested by such are often scarcely appreciable, and the increased action itself subsides towards the period of puberty by the establishment of a more correct proportion and equilibrium between the heart and the system.

At the adult age also, and during the whole period of manhood, an individual of an otherwise sound and vigorous constitution may be affected with hypertrophy to a moderate extent, without experiencing any sensible deterioration of the general health (with the exception of being more liable than others to cerebral and phlogistic affections), or any diminution of muscular force and activity; and if his habits with respect to diet and exercise be moderate, he

may pass a long series of years, and even attain the extreme period of senility, without being conscious that he is the subject of organic disease. The only general signs denoting the existence of the malady will be, perhaps, a little shortness of breath on exertion, and occasional feelings of slight palpitation. Amongst the labouring classes these symptoms, even in a considerable degree, are so little regarded that their presence is often disavowed by the patient, though palpably manifest to the physician. If, however, an individual affected with hypertrophy abandon himself to intemperate living, or engage in occupations requiring great corporeal exertion, he rarely fails to bring on either apoplexy, palsy, hemoptysis, or an irremediably aggravated state of the disease, which embitters and curtails his existence.

The celerity with which these accidents are induced depends on circumstances. In general, the progress of hypertrophy is very slow and gradual, but in some cases it is rapid: in several instances we have known it terminate fatally within a year from its commencement. The circumstances occasioning these variations are connected with—1, the form of the disease; 2, its complications; 3, the nature and intensity of the external exciting causes; and, 4, the constitution of the patient. It is of the utmost importance that the practitioner be able to form some estimate of the influence of these circumstances; for it is by this means only that he can foresee the course of the disease, and direct his treatment with judgment and decision. It may be useful, therefore, to enlarge a little on this subject.

1. The progress and termination of hypertrophy are influenced by the form of the disease. *Simple hypertrophy* is more apt than any other form to induce apoplexy while the patient is apparently in perfect health. This is to be accounted for by its tendency to create plethora, while at the same time it does not incapacitate the patient for active corporeal exercise and the pleasures of the table. When premature death does not occur from apoplexy or hemoptysis, simple uncomplicated hypertrophy runs a more chronic course than any other form of the disease.

Hypertrophy with dilatation, especially if great, is a far more harassing, dangerous, and, if we may be allowed the term, *acute* affection than the preceding. All its symptoms are more violent, and its course is more rapid. It is somewhat less apt to occasion unexpected attacks of apoplexy; probably because the greater dyspnoea which it occasions deters the patient from violent exercise and high living. When once the palpitation and dyspnoea have attained such an extent as *imperatively* to demand periodical bleedings at brief intervals, the malady hurries with an uninterrupted course to its fatal termination.

2. The progress and termination of hypertrophy are influenced by its complications. When hypertrophy is connected with contraction of an orifice or any other obstacle to the course of the blood, the symptoms are greatly aggravated. For, first, in consequence of that

* See much valuable information on this subject in the "Procédé Opératoire" of M. Piorri, Paris, 1830, p. 112, et seq.

obstacle, the hypertrophy proceeds to a greater extent; and, secondly, the violent struggles of the heart to surmount the obstacle subvert the general balance of the circulation. To speak more explicitly, suppose the obstacle to be situated in the aortic orifice. While the left ventricle is palpitating to disgorge itself through the contracted aperture, the right, acting in concert with it, deluges the lungs with an inordinate quantity of blood; whence ensues a paroxysm of dyspnoea: next, in consequence of the pressure of blood through the lungs, the supply to the left ventricle is increased. This ventricle, therefore, instead of relieving its engorgement by palpitation, only aggravates it, and the fit does not subside until either the heart becomes gradually exhausted by its own efforts, or (what is more common) until the internal congestion is relieved by determination to the surface or a copious discharge of watery mucus from the lungs. The most violent, though perhaps not the most distressing, paroxysms of palpitation and dyspnoea that we have witnessed have occurred in the particular complication described. In others there may exist a greater feeling of suffocation (the source of the greatest distress), as will hereafter be explained in the articles VALVES, DISEASES OF THE, and POLYPI.

Adhesion of the pericardium, which rarely fails to produce hypertrophy with dilatation, is an extremely formidable complication of this malady. It greatly aggravates all the symptoms, and accelerates the fatal event, which not unfrequently takes place within the period of a year; and we have known it occur in nine months.

Febrile or inflammatory complaints supervening on an advanced degree of hypertrophy exasperate the malady in a surprising manner, so as not unfrequently to carry off the patient in the course of a few days. The effect seems to be produced by the febrile excitement keeping up, as it were, a perpetual fit of palpitation and embarrassment of the circulation, which the constitution cannot support beyond a brief period. Peripneumony has pre-eminently this effect; apparently because it not only excites the heart, but obstructs the circulation through the lungs.

3. The progress and termination of hypertrophy are influenced by the nature and intensity of the external exciting causes.

The principal of these are, over-exertion, excesses at table, and mental perturbation, the latter of which, though not strictly external, may be ranged under this head. The effect of these requires no explanation, but it may be said that the dangerous influence of over-eating is greatest in simple hypertrophy, because it generates plethora and increases the tendency to apoplexy; while over-exercise and intemperance are more prejudicial in hypertrophy with dilatation, because they increase the dilatation, which is the more dangerous part of the disease.

4. The progress and termination of hypertrophy are influenced in a remarkable degree by the constitution of the patient. The robust

resist its encroachments much longer than those who are delicate and effeminate: and if the former, either from bad air or want of exercise, from disease, or from age, become unhealthy, emaciated, and feeble, they are rendered much more susceptible of the effects of the disease. This (if we may indulge in a mere speculation) is possibly in consequence of emaciation taking place to a greater extent in the muscular and adipose tissues than in the internal viscera, whence, the latter becoming predominant in size, the equilibrium between the heart and the system is subverted. This is exactly the converse of what occurs at the period of puberty in those who had laboured under enlargement of the heart when children, for in them the equilibrium is restored by the system enlarging with the growth in proportion to the size of the heart.

Prognosis.—The general prognosis is favourable in the early and unfavourable in the advanced stages of the disease. The particular prognosis must be founded on an estimate of the various circumstances of the case formed according to the above rules.

Treatment of hypertrophy.—As it is easier to diminish the nutrition of the heart than to increase it, or to remove a valvular or other mechanical obstruction, it is very conceivable that hypertrophy is more susceptible of cure than any other organic affection of the heart.

In the treatment the first care should be to remove any known exciting cause of the malady. It is equally obvious that as this malady consists in an increased power and action of the heart, bloodletting and other reducing and tranquillizing means are the appropriate remedies. Laennec strongly recommends that they be employed with courage and perseverance on the plan of Albertini and Valsalva. We cannot say that our own observation leads us to coincide entirely in this opinion. We shall first, therefore, give a sketch of the treatment alluded to, the sanction accorded to which by names of the highest authority renders it at least deserving of the most attentive consideration; and shall afterwards point out in what respects it appears to us to be objectionable.

This treatment, according to M. Laennec, ought to be prosecuted in an energetic manner, especially in the commencements; and in aiming to enfeeble the patient, we ought much more to fear resting short of the mark than exceeding it. We should commence by abstracting blood as copiously as the patient can support without falling into a state of sinking; and we should repeat the operation every two, four, or eight days, until the palpitations have ceased, and the heart no longer gives, under the stethoscope, more than a moderate impulse. We should, at the same time, reduce to at least one half the quantity of aliments which the patient ordinarily takes, and diminish even this quantity if he preserve more muscular strength than suffices to take, step by step, a walk of a few minutes in the garden. In a stout adult Laennec usually reduces the quantity of aliments to fourteen ounces a day, amongst which he thinks there should be only two ounces of white animal food. If the patient wishes to

take broth or milk, he counts four ounces of these liquids for one of animal food. Wine ought to be interdicted. When the patient has been about two months without experiencing palpitation, and without strong impulse of the heart, we may dispense with the bleedings, and somewhat diminish the severity of the regimen, if habit has not yet been able in any degree to reconcile him to it. But it is necessary to revert to the same means, and with equal rigour, if in the sequel the impulse of the heart increase again. We ought not to have confidence in the cure until the expiration of a year of complete absence of all the symptoms, and especially of all the physical signs of hypertrophy. We must be afraid of allowing ourselves to be deceived by the perfect calm which bloodletting and abstinence sometimes very promptly produces, especially if we have commenced the treatment at a period when the hypertrophy was already accompanied with extreme dyspnoea, with anasarca, and with other symptoms which gave reason to fear an approaching death.

If we begin the treatment of hypertrophy of the heart at a period when it has already produced severe effects, particularly anasarca, ascites, œdema of the lungs, and a very marked state of cachexy, we ought not on that account to shrink from bleeding and abstinence. To obtain success, it is necessary, according to the same author, that the physician and the patient arm themselves with almost equal patience and firmness; for it is not more difficult for the latter to resign himself to perpetual fast and frequent bloodlettings, than for the former to struggle daily against the opposition of relations, friends, and the discouragement which cannot fail to seize upon the patient in a treatment which ought to continue at least several months, and sometimes to be prolonged during several consecutive years.

Such is the manner in which M. Laennec employs the treatment of Albertini and Valsalva; and he states that he could cite a dozen instances of cures of hypertrophy, either simple or with dilatation, which have not been falsified for several years. One important case which he details, seems to prove that the treatment causes atrophy of the heart; for the organ was remarkably less than the fist of the subject, and was shrivelled or wrinkled in a longitudinal direction.

Our objections to the treatment described are founded on the circumstance that, though we have invariably found the greatest benefit to be derived from sparing abstractions of blood at intervals of two or three weeks or more, we have constantly noticed that when from the severity of the dyspnoea and palpitation in the advanced stages of the complaint, the practitioner was induced, or thought himself compelled, to resort to frequent bleedings at short intervals, the patient, though perhaps momentarily relieved, progressively declined from that moment, the paroxysms recurring more frequently and with greater violence, until they eventually terminated in his destruction. Now, on comparing a patient under these circum-

stances with one under the influence of mere reaction from loss of blood, the analogy appears to us to be very intimate. In both, the violence of the heart's action, so far from being repressed by a reiteration of the bloodletting, is only increased: in both the blood is, and necessarily must be, attenuated and deteriorated in consequence of the fibrinous portion and red globules being replaced to a greater extent than natural by serum, which is more expeditiously regenerated.

These, then, are apparently the causes of the patient's decline. The prejudicial effects of the reaction are sufficiently obvious; and the state of the blood not only contributes in all probability to the reaction,* but, by its deteriorated quality, is unsuitable for the due nutrition and conservation of the system.†

It would appear, therefore, that the indications in the treatment of hypertrophy are, to diminish the quantity without materially deteriorating the quality of the blood, and to do this in such a manner as, without producing reaction, permanently to enfeeble the action of the heart and the energy of the circulation. The safest and most effectual means of fulfilling these indications have appeared to us to be the following:

Four, six, or eight ounces of blood should be taken every two, three, four, or six weeks, according to the strength of the patient, and sufficient to keep down palpitation, dyspnoea, and strong impulse of the heart. If the head be much affected, the blood should be drawn by cupping from the nape of the neck. The diet should consist of white animal food and liquids in small quantity, unless, from the advanced state of the disease, the blood be so impoverished as to be insufficient for the maintenance of the system, when a more nutritious though still spare diet may be allowed. Every thing stimulating, as spirituous and fermented liquors, and highly seasoned dishes, should be avoided. Any exercise taken should be so gentle as never to hurry, and, if possible, never even in the slightest degree to accelerate the circulation. When the action of the heart appears to increase, and yet general bleeding is not expedient, three or four copious and watery alvine evacuations should be procured daily by saline aperients, of which none answers better than one or two drachms of sulphate of magnesia in infusion of roses twice or thrice a-day. This may be continued for a week or ten days according to the effect; and either the same or some analogous aperients should be employed habitually in sufficient doses to keep

* Vid. Treatise on Dis. of the Heart, by the writer, p. 75.

† It does not follow that though the treatment of Albertini and Valsalva be unsuitable for hypertrophy, it is equally so for aneurism of the aorta; as in the latter the object is to produce a sudden and extreme, though temporary reduction of the force of the circulation, in order to promote the formation of fibrinous coagula in the sac: an expedient which is sometimes perfectly successful in effecting a cure of aneurism, but which will not have the same effect on hypertrophy.

the body gently open, and to procure, if possible, liquid evacuations. When salines are used habitually, their debilitating effects on the intestinal canal may be in a great measure counteracted by adding to the infusion of roses an equal quantity of comp. infus. of orange-peel, and six or eight minims of diluted sulphuric acid.

In addition to purgatives we have seen the most decided advantage result from diuretics; and not only when there was dropsy, but equally when there was none. Their mode of operation appears to be ultimately the same as that of purgatives; namely, they drain off the serous portion of the blood. We have found many patients, conscious of the benefit which they derived from this class of remedies, to be in the constant habit of taking cream of tartar, broom-tea, and other similar popular medicines. One patient affected with contraction of the mitral valve to the size of an ordinary pea, by these means warded off dropsy, beyond the slightest oedema of the feet, for ten years. When decided dropsy appears, it must be combated by the most efficient diuretics—the supertartrate, tartrate, acetate and nitrate of potass, squill, digitalis, spirit of nitric ether, decoction of broom, &c., with mercury if not contra-indicated. As no class of remedies is more variable and uncertain than this, when one fails another should be resorted to; and it not unfrequently happens that a weaker is more successful than a stronger. Should diuretics wholly fail, hydragogue purgatives, as elaterium, tincture of jalap, infusion of senna with tartrate of potass, &c. are often invaluable substitutes.

The state of the stomach and of the biliary secretion should never be overlooked in hypertrophy, as their derangements are amongst the most efficient exciting causes of palpitation. The remedies suitable for dyspepsia and bile are therefore to be resorted to. We deem it unnecessary here to enlarge on them, and on the treatment of dropsy, cough, dyspnoea, &c. as these subjects will be found fully discussed in the article VALVES, DISEASES OF THE.

It frequently happens that, notwithstanding the most judicious use of the remedies mentioned, the irritability of the nervous system frustrates their tendency to reduce and tranquillize the action of the heart. In this case sedatives are eminently useful, and the best effects often result from tincture of digitalis, to the extent of *mx* or *xxx* twice or thrice a-day; from two or three drops of hydrocyanic acid, administered as often; from three or four or more of extr. of hyoscyamus or conium once or twice a-day; and from half a grain of acetate of morphia twice a-day.

The above, and indeed every other mode of treatment is unavailing if not *steadily* pursued, and it must be pursued for one, two, three, or more years. Thus employed, we have found it effect cures in a considerable number of instances, some of which were advanced even to the second degree. In the first degree, especially before the period of puberty, this fortunate event is often obtained although bleeding be

resorted to only at long intervals, as of from six weeks to three months.

(J. Hope.)

HYPOCHONDRIASIS.—1. *Definition and characteristic of the disease.*—Hypochondriasis, or the hypochondriac malady, is a disease in which symptoms of dyspepsia, such as flatulence, eructation, with a sense of uneasiness in the stomach and hypochondria, are combined with a remarkable lowness of spirits or a desponding habit of mind, and a constant disposition to attend to every minute change in the bodily feelings, and to apprehend extreme danger from the most trifling ailments. The last-mentioned feature in the complaint has been particularly selected and strongly described by the nosological writers. “Desperant ægri de suâ valetudine recuperandâ ob ructus, borborrygmus, palpitationes, tremorem præcordiorum, fugaces vertigines, flatulentiam. Hinc persuasi fatum lethale sibi imminere, omnia symptomata et minimas mutationes in corpore suo scrupulosè observant, narrant et describunt medicis, suisque querelis alios mox et alios defatigant, ingenio cæterum et appetitu pollentes.”* By some writers hypochondriasis has been regarded as a mere variety or accidental modification of dyspepsia. Nearly in this light it appears to have been considered by Hoffmann, who wrote an able but somewhat prolix treatise “de malo hypochondriaco.”† He termed it “a spasmodico-flatulent affection of the primæ viæ, namely, of the stomach and intestines, arising from a disturbed and inverted peristaltic action, by sympathy throwing the whole nervous system into commotion, and deranging all the functions of the animal economy.” Sydenham in his celebrated treatise on hysteric diseases identifies those disorders with hypochondriasis. He says that the most peculiar symptom is the “making large quantities of urine as clear as rock-water.” This, on “diligent inquiry, he found to be the distinguishing sign of those disorders, which we call hypochondriacal in men and hysteric in women.” Hoffmann strenuously opposed this doctrine, and insisted on the position that, although the hypochondriacal and hysterical diseases have many symptoms in common, yet they have also several peculiar ones, which fully manifest an essential difference in their nature. Among the reasons which he assigns for this opinion, some of which are quaintly expressed, is the circumstance that “no hypochondriacs were ever judged to be dead, and intended to be interred, which,” he says, “is credibly reported of hysteric subjects.”

2. *Description of the phenomena.*—A most striking circumstance in the description of hypochondriacal affections is the remarkable difference which is observable between the appearance of the patient and the state of his health as collected from his own account of his symptoms and internal feelings. The indi-

* Sagar. Nosolog.

† Opera Hoffmanni, tom. iii.

vidual who labours under this malady seldom presents any external indication of disease; he has often the appearance of sound and even of robust health: yet, if we listen to his statements, every function of life, every part in the whole fabric of his body, is in a state of disorder, and the source of acute and almost perpetual suffering. It was observed by Hoffmann that as fever is the most general of acute diseases, and pervades the whole frame and every function of the body, so among chronic complaints this seems to be equally extensive in its influence, affecting the nervous system in every part, and every where giving rise to local pains or feelings of distress. The more constant of these complaints are referred to the alimentary canal, and it is in the functions belonging to that part of the animal economy that evident traces of real disease are chiefly to be discovered. The patient complains of distention of the stomach and hypochondria, which are inflated with wind; he often refers his uneasiness chiefly to the left hypochondrium, where there is in reality considerable fulness and induration: in some instances there is considerable enlargement of the abdomen, with a degree of hardness and a feeling of consolidation which excite suspicion of some organic disease. The tongue is generally clean, or covered with a slight brown coat; the stomach is the seat of every symptom of disordered action; the appetite is often irregular, sometimes voracious and hardly to be satisfied; more frequently there is a total want of inclination to eat, and even a loathing of food; after eating, the patient complains of a sense of weight and uneasiness in the stomach; sometimes this amounts to rather severe pain, which recurs at a short interval after every meal; and eructations, cardialgia, or a sense of burning heat at the extremity of the œsophagus, ensue, and after a longer time wind is expelled in large quantity, with a sense of cramp succeeding the effort; sometimes viscid mucus is brought up, with half-digested food and a fluid so strongly acid as to corrugate the throat and set the teeth on edge. In other cases nausea prevails almost constantly, and prevents the patient from taking sufficient food for supporting strength; when a small portion is swallowed it produces great irritation in the system, headach, pulsation in the epigastrium, and flushing in the face; occasionally these symptoms are relieved by vomiting. The patient experiences severe pains through different parts of the abdomen, which he describes as burning, twisting, tearing, and distending the bowels; seizing suddenly different parts of the alimentary canal. He feels a momentary relief when wind is expelled, but the sense of distention soon returns. The bowels are often disposed obstinately to constipation; this state gives way occasionally to looseness; when this last condition supervenes, or when it is brought on by cathartic remedies, all the feelings of distress are aggravated; in addition to his former evils, the patient now suffers an intolerable anxiety, a sense of sinking, fainting, trembling, and apprehends that every minute may be his last: he complains of violent palpitations, pul-

sations of arteries in the abdomen, burning heats, intolerable anguish, whenever his bowels are brought into action.

In the early periods of the disease the complaints refer more particularly to the abdomen; in a more advanced stage this class of symptoms is not diminished, but others are superadded, consisting of a variety of morbid feelings in different parts of the body, but more particularly in the head. Patients complain of violent pains in the forehead and temples, sometimes in the occiput; of severe and distressing headach with intolerance of light. In more frequent cases they experience, not pain, but some indescribable sensations which are more difficult to endure than the most severe pain; a sense of intolerable pressure on the top of the head threatens at every moment to extinguish consciousness and life itself; the head is as if squeezed in a vice, the scalp is drawn tight, and the eyes are felt as if starting out of the sockets; these sensations alternate with vertigo or a feeling of giddiness; the eyes sparkle, twinkle, grow dim; vision is impaired; it is impossible to look at a book or to direct the eyes for a moment to any near object without experiencing a sense of confusion; there is a noise in the ears, like the ringing of bells, bursting, boiling of tea-kettles; rushing of water; the sound of a steam-engine; strange voices; sudden cracklings; whizzings. The power of attention is destroyed, at least the patient is persuaded that such is the fact, though when aroused, by any sudden intrusion, from his tale of sufferings, he is as lively and acute as ever; he cannot think, his ideas are confused. Sometimes he fancies that his understanding is utterly destroyed, that he shall become insane and die in a madhouse. The susceptibility to all impressions on the senses is morbidly increased. Light, sounds, noises, are intolerable. Mental exertion is often the most difficultly endured of all the causes of excitement. If the feelings are aroused, or the attention is kept alive, especially if it be in the later part of the day, sleep is entirely banished, and a state of general irritation is induced.

The mind labours under a degree of morbid excitement in hypochondriac patients; but this is very distinguishable from all the modifications of insanity. The morbid feelings of the hypochondriac are real; they depend on physical disturbances of the system, which he apprehends to be much greater than they are; and this apprehension leads him to dwell upon them, and make them the subject of conversation whenever he has an opportunity of doing so. Yet he sometimes appears to suspect that the long detail of his sufferings may fatigue the patience or excite the contempt of those who listen to him, and he will even suppress a part of the catalogue of his symptoms, which he is at the same time anxious to communicate. The uncomfortable feelings of the hypochondriac are excessively magnified by his fears and the concentration of his thoughts and attention to his disease, and he may sometimes express weariness of life and a desire that his existence may soon terminate; but it is certain that he is

insincere in these expressions, and that he is always under the utmost anxiety to try every possible method for the preservation of his life and the restoration of his health. Such persons will often consult all the physicians of reputation in their vicinity, and will even have recourse to quacks, old wives, and nostrum-mongers; nor is there a remedy that can be suggested too absurd to merit at any rate a trial. An elderly gentleman, who had been for some years labouring under hypochondriasis, combined with amaurosis, sent for a physician in great haste, eagerly requesting an immediate visit. The object of the invalid was to inquire whether any danger would arise from his adopting a remedy which had been strongly recommended by a neighbour or friend. This was to put a piece of stone-brimstone on his head, and walk about the room, having it there fixed. He had been persuaded that some great benefits would be derived from this attempt, if it could only be put in practice without risk. The same individual would describe with the greatest minuteness the sensations which he experienced after taking a dinner-pill, and trace its progress through the whole intestinal canal. He could tell by his feelings where the aloës became dissolved, and where it mixed with the aliment, as exactly as if he had seen through the parietes of the abdomen and the coats of the intestines. He would walk about his room in despair, wringing his hands and bemoaning his condition; yet if any person mentioned by chance the subject of a controversy which he was carrying on in a periodical journal, he would forget all his miseries, and enter into conversation with lively interest.

Besides the morbid sensations referred to the abdomen and the head, there are others which affect the limbs. These are sometimes described as if they were neuralgic pains running along the course of the nerves. More frequently feelings of numbness, deadness, tingling, are described as occurring in the legs, arms, or fingers; the head is said to feel dead and benumbed; sometimes this sensation is referred to the back or to the limbs. Sensations which are considered as more characteristic of hysteria are occasionally described by hypochondriac patients. There is a sort of constriction round the throat, threatening suffocation; but this does not amount to globus hystericus, nor is it accompanied with fits of panting or anhelation. The urine, as in many other disorders affecting the nervous system, is copious and colourless. Sydenham mentions the case of a nobleman who laboured, as he says, under "an hypochondriac cholic." Whenever he was worse, he voided a clear colourless urine, and on any abatement it became straw-coloured. He was nearly convalescent, when some person coming in suddenly and putting him into a violent passion, "he immediately thereupon made a large quantity of very clear water." The limpid urine of hypochondriac patients has been examined by M. Vauquelin, and found to contain rosacic acid.*

The functions of the thoracic viscera are sometimes disturbed in hypochondriasis. As in other diseases attended with dyspepsia and flatulence, the heart suffers interruptions in its action; the pulse is often intermitting, more frequently it is variable and irregular; the patient is troubled occasionally with attacks of palpitation, and these are sometimes so severe, and the action of the heart is so violent, as to excite suspicion of organic disease. Nothing is more certain or better known to medical practitioners than the fact that hypochondriacal and hysterical subjects have often been treated under the impression that they laboured under hypertrophy of the ventricles. In some instances hypochondriasis is attended with attacks of dyspnoea and constriction of the chest, a feeling of something squeezing the throat, and other phenomena approaching to those which characterize the paroxysms of hysteria.

All medical authors who have treated on hypochondriasis, and all judicious physicians who have well considered the complaint, are agreed in testifying that the evils which it inflicts are far from unreal and imaginary. To treat them as such, or to let the patient perceive that we do not fully sympathize with him, that we consider his complaint as one which it is in his power by an effort to shake off, is most impolitic and injudicious. Dr. Cheyne, who gave to this disease the designation of the *English malady*, says emphatically, that "of all the miseries which afflict human life and relate principally to the body, nervous disorders in their extreme and last degrees are the most deplorable and beyond all comparison the worst."

No definite observations can be made as to the rise, progress, and duration of hypochondriasis. The causes are chiefly of slow and continued influence, and their effect displays itself for the most part gradually and almost imperceptibly. The disease has been brought on suddenly by some powerful impression on the nervous system, as, for example, by some cause which occasioned overwhelming grief or vexation, but such instances are comparatively few. It continues for years, sometimes through the life of the individual, who cannot escape from the exciting causes which gave rise to it; but it does not of itself shorten life. There is reason, however, to believe that hypochondriacs are more subject than other persons to acquire organic diseases of the abdominal as well as the thoracic viscera; yet on this subject no exact reports are to be found. The long duration of the disease, the circumstance that persons who labour under it are seldom throughout its course under the care of the same practitioners, and especially that they do not in the ordinary course of things die in hospitals, are sufficient to account for the deficiency of exact information on these points.

3. *Diagnosis.*—One of the most difficult considerations connected with hypochondriasis is the diagnosis of this disease from others with which it is more or less liable to be confounded, and this is likewise the most important point of view in which the subject

* M. Georget, Dict. de Médecine.

can be contemplated. The complaints of the hypochondriac are so multimform that they suggest a great variety of morbid affections, and some of these are among the most severe diseases to which the animal economy is subject. The disorders which are symptomatic of hypochondriasis must in their turn be distinguished from the organic diseases which they simulate, or some fatal error will be likely to arise when the medical practitioner either pursues a more active method of practice than the real circumstances of the case require, or neglects to adopt energetic remedies when absolutely necessary in order to avert impending danger.

When an individual is known to labour under hypochondriasis, this circumstance will often throw light on the nature of his temporary ailments. If such a person complains of dreadful pains in the head, vertigo, temporary loss of sensation and of memory, or of palpitation or intermission of pulse, we shall be on our guard, and shall less readily ascribe such complaints to disease in the head or in the heart, than if they occurred in patients under different circumstances. Still the diagnosis is imperfect unless it is absolute on the negative side, for hypochondriacs may and do become the subjects of organic diseases. Nor is the constitutional disorder of these persons always so marked as we might imagine from the foregoing description of their disease. Hypochondriasis does not affect simultaneously and in every case all the functions said to become deranged. Sometimes its manifestations are distinct and strongly marked in the state of the abdominal viscera, and in such cases there is comparatively little ground for mistake. Sometimes the functions of the heart are considerably deranged when the symptoms are elsewhere obscure. In these instances we know that experienced and skilful practitioners have been deceived. When the disorder is principally seated in the head, it likewise occasions difficulties; and these difficulties are not lessened by the circumstance that the diagnosis is on the negative side.

In order to distinguish hypochondriasis from diseases locally affecting the abdomen, an attentive examination will sometimes be required. (See ABDOMEN, EXPLORATION OF THE.) Care must be taken to distinguish the disorder which we are now considering from organic diseases of the stomach, in cases attended with long continued vomiting of the ingesta; from affections of the liver and pancreas; from the results of stricture in the intestinal canal: in other instances, from recent though still subacute diseases of the same canal, as from gastro-enteritis, which Broussais is disposed to identify with hypochondriasis. The latter distinction is not always exempt from difficulty; there are many obscure cases in which the disorders are intermixed; and where they exist separately, the diagnosis is not so easy as many persons may be inclined to imagine. We cannot wholly rely on the presence or absence of pain when pressure is made on the abdomen. Little or no pain is in general produced by such pressure in cases of

hypochondriasis; and it commonly occasions suffering in some part, when there is much abdominal inflammation. But the mucous membrane of the bowels may be the seat of disease without giving occasion to pain on pressure. On the other hand, hypochondriacs are ready to exclaim whenever they are touched; the excited state of their apprehension augments the real feeling of uneasiness, which depends upon increased sensibility of the subcutaneous nerves. It will be found, however, that they bear a strong and continued impression better than a slight and momentary one. The state of the bowels in hypochondriasis is generally rather constipated, and often loose and irritable in gastro-enteritis; but these observations are not very unfrequently reversed. The absence of febrile symptoms; the capability of using exercise; the more healthy appearance of the countenance; the preservation of muscular strength and fulness, with the condition of the appetite, which in many cases of hypochondriasis is unimpaired, and in others greater than usual; will in most instances enable the practitioner to distinguish this disease from gastro-enteric inflammation.

The signs have often been laid down by which disorders of the heart depending upon organic causes are distinguishable from the irregularities arising from dyspeptic and nervous complaints. During the paroxysms of palpitation which belong to this latter description of diseases, symptoms are often perceived which lead to the suspicion of organic affection. M. Andral has indeed observed that the pulsations of the heart are often irregular, and accompanied with a "*bruit de soufflet*" in cases purely hypochondriacal or nervous. He has observed violent palpitation succeed during the interval of the attacks by morbid dyspnoea and even perceptible swelling of the face, in cases which were independent of any organic disease of the heart.

These remarks will be sufficient to shew that practitioners should be upon their guard in pronouncing as to the nature of disorders in the functions of the heart affecting hypochondriacs. It would be superfluous under this head to go into detail on the pathognomonic signs of organic diseases of the heart, as these have been fully considered in their proper place. The proof that complaints referred to the heart are hypochondriacal and not organic is likewise in a great measure of a negative kind. If the patient is low-spirited and nervous, if he has been known to be subject to hypochondriasis, the probability is on this side. If he has never undergone any apoplectic, epileptic, or paralytic attack; if he preserves his natural and habitual degree of muscular power, and his senses are not in any way impaired; if all the functions of his brain are uninjured, we may almost venture to conclude that the complaints which he makes of morbid sensations in the head do not indicate so much danger as he supposes. Still, when these complaints are accompanied by discoverable signs of irregular circulation; when the vessels are full and beating forcibly, the head hot and

flushed; and when the general appearance indicates a plethoric state of the vascular system in the head, it will be advisable to relieve this state by depletion, either general or local, according to circumstances.

Hypochondriasis must be distinguished from insanity. The discrimination is not difficult. Persons who labour under the former disease have possession of their reason, and the sufferings they describe are really experienced by them, though not so dangerous as they are supposed by the sufferer to be. If a hypochondriac begins to declare that his head or his nose is too large to pass through a doorway, or displays any other hallucination, he has become a lunatic: his disorder has changed its nature, and this conversion takes place occasionally, though it is by no means so frequent as many persons probably apprehend. Hypochondriacs, though low-spirited and dejected, are in a very different state of existence from persons labouring under melancholia. The apprehensions of the former are all centred on the state of their bodily health: on other subjects, they think and often converse rationally and with cheerfulness. The melancholic views all things through a medium of gloom and despondency. Lastly, the feelings and affections of hypochondriacs are not in that perverted and unnatural state which is one of the characteristics of madness in nearly all its forms.

Causes of hypochondriasis.—There is no particular constitution or temperament of body, at least there is none distinguished by known external characters, that is remarkably subject more than others to hypochondriasis. We have observed this disease frequently affecting persons who bore all the external marks of the sanguine temperament as well as others who had the characters of the melancholic.

The middle period of life, and perhaps the interval between the twenty-fifth and the fiftieth year is the age which is principally disposed to this disease. It seldom attacks young persons, or, for the first time, those advanced in years. Men are more subject to it than women, though in the latter it not unfrequently occurs. This, however, is seldom the case in respect to young females. With them disorders of the nervous system are more disposed to assume the character of hysteria. Females upwards of fifty years of age are often subject to dyspepsia, flatulence, eructations, gastrodynia, attended with gloom, depression of spirits, and other symptoms of the hypochondriac malady, though not frequently in so strongly marked a form as that which it assumes in men.

The predisposing causes of hypochondriasis, or the antecedent circumstances which are followed by that disease, belong to two different classes, one of which are influences affecting the mind directly and the functions of the body only through this medium: the other series of morbid agents produce their effect, in the first instance, on the abdominal viscera and the processes of physical life; the affection of the mind which follows being apparently dependent on this derangement.

These morbid influences are sometimes blended in the habits of life which produce a peculiar tendency to hypochondriasis. Such are the modes of existence which allow of little bodily exercise, and at the same time occasion an overstrained and continued exertion of the mind. The state of manners in civilized society gives rise to this unfortunate combination of circumstances in a thousand ways, and multiplies, together with the comforts of life, all the sources of mental fatigue and over-exertion, and consequently the number of hypochondriacs. Intense and long-continued exercise of the intellect in one pursuit, whatever it may be, is frequently the cause of this disease. Hence hypochondriasis has been termed the disorder of literary men, "*morbus literatorum*;" and Hoffmann says that its victims are chiefly "*virī chartis impallescences et inter libros sepulti*." Clergymen, schoolmasters, persons employed in diplomatic business, and in other occupations requiring activity of mind, and giving occasion to sedentary habits, are equally liable to be attacked by it.

Among the classes of sedentary men who frequently become hypochondriacal are tailors and shoemakers. Their constant habit of sitting at their trades, and their peculiar modes of sitting, probably occasion a torpid state of the intestinal canal, and disorder of the functions connected with it. Their minds are also active beyond their craft; witness the proverb, *ne sutor*, &c. and the number of preachers, theologians, founders of sects, and political reformers, who have arisen from the cobbler's stall and the tailor's board.

There are other classes of persons whose predisposition to hypochondriasis cannot be explained in the same way. Agricultural labourers, men who spend a great portion of their time in working in fields, in digging, making and mending hedges and ditches, and in solitary employments in the country, are frequently affected with low spirits and the other characteristics of this disorder. The solitariness of their employments is probably the chief predisposing circumstance.

Some medical authors are inclined to suppose that hypochondriasis arises almost solely from causes affecting immediately the brain and nervous system. Several French writers have maintained this opinion, and probably it may be better supported by facts in France than in this country. M. Louyer de Villermay, in his work entitled "*Traité des Maladies Nerveuses*," has adduced evidence which bears upon this inquiry, and it is only to be regretted that the sphere from which it was drawn was not more extensive. Out of thirty-six cases of hypochondriasis recorded by this writer, the disease appears to have arisen in twenty-two from "*moral affections of a painful description*," by which we are to understand causes giving rise to mental distress: in eight cases out of the same number it was occasioned by too close application to study; in two it arose from fright or sudden alarm; in two it followed an immediate transition from a state of life requiring great activity to one of ease

and leisure. These facts are favourable to the opinion that hypochondriasis is a primary disorder of the nervous system, a conclusion which has been adopted and supported with much ingenuity by M. Georget. This writer considers the disease in question to be one of the brain, excited by the influence of moral agents, or by those causes which act in a hurtful manner on the mind, and through that medium on the brain. He observes, in support of this opinion, that hypochondriasis is most common in the higher classes of society, among persons occupied in official and diplomatic business, or devoted to literary pursuits. "England," he adds, "is perhaps the country where this species of nervous disease chiefly abounds: this is principally owing to the prodigious activity of mind which exists in that country; to the miseries which are contingent on the great development of industry; to fortunes rapidly acquired in commerce by a number of individuals who subsequently pass their whole lives without employment, in excesses of every description." In this last particular, M. Georget has expressed himself rather conjecturally than from a knowledge of facts. It cannot be truly said that a considerable proportion of those persons who accumulate property in this country by the exertions of industry, abandon themselves afterwards to excesses of all descriptions. Indeed the excesses of vulgar dissipation are not to be reckoned among the ordinary causes of hypochondriasis. This disease seldom attacks persons who are addicted to the immoderate use of fermented liquors; it rather falls to the lot of those who are abstemious in this respect.

Hypochondriasis is not in reality confined to the better classes of society, or to persons of cultivated minds, on whom moral causes may be supposed to act with the most extensive influence. Cases occur frequently in hospitals, and therefore among the lower orders. The writer of the present article has had under his care, or at least under his occasional observation upwards of twenty years, two patients of this description who are among the most ignorant of the lower class of peasants. They both furnish strongly-marked examples of hypochondriasis; both have been tormented during a great part of the space above mentioned by the numerous and frequently varying but ideal miseries which accompany that disease. In both of these persons the nervous system appears to have been originally weak and susceptible of impressions; but the causes which actually gave rise to morbid phenomena in their constitutions could scarcely belong to the class of moral agents; they were circumstances which induced disorder in the physical or natural functions. The same conclusion may be drawn with great probability in most of those instances of hypochondriasis which occur among persons of the lower classes.

We may state in a summary manner that the causes which occasion hypochondriasis as an idiopathic complaint are, agents which exercise an hurtful influence on the mind, and through it on the nervous system; too intense and long continued application; studies

and professions which require great intellectual exertion; anxiety respecting the success of schemes and prospects of worldly advancement; disappointment of various kinds, and consequent dejection; and lastly, though this is by no means the least important article in the catalogue, the indulgence of vicious habits which tend to debilitate the mind and body. The noxious influence of these causes is exerted in the first place on the nervous system; the functions of physical life are affected by sympathy; nor are such affections difficult to understand or to reduce to the general analogy of facts in pathology; but this is a consideration which belongs to the next section.

There are very many instances of hypochondriasis in which, as we have before suggested, the predisposing causes are those which give rise in the first place to dyspeptic ailments, and to disordered actions of various kinds in the alimentary canal. Sedentary habits, a poor diet, the abundant use of warm diluent fluids, tea, coffee, and the like, a constipated state of the bowels subsisting habitually and long continued, are the most frequent of the causes reducible to this class. The disease appears to be more common among the lower ranks of society in this country than in France, and that, if we are not mistaken, is particularly the case with respect to women. A great number of the wives of cottagers, and old women who live with their own families, and not in domestic service, are fed in England chiefly on bread and tea, seldom getting either much animal food or any fermented liquors. Of these a considerable proportion are dyspeptic and many are hypochondriacal.

Pathology.—Anatomical researches have thrown no light on the pathology of hypochondriasis, nor does it appear probable that the subject will ever be elucidated by such means. Organic changes of almost every description have been discovered in the bodies of persons who have been the subjects of this malady. Their diversity is too great to allow of the supposition that they are all connected with one complaint. The individuals in whose bodies they have been discovered have terminated their existence under various diseases. Hence the diversity of morbid phenomena, which, if it were possible to trace the connection of causes and effects, would probably be found to have stood in no near relation to the hypochondriacal ailments which affected the individuals in question without endangering life, or ultimately accelerating its termination.

Medical writers have long been divided in their opinions with respect to the seat and nature of hypochondriasis. Some have regarded it as a primary disease of the nervous system in general, or of the brain itself; while others have looked upon the affections of the nervous system as secondary, and depending upon sympathy with a disordered state of functions belonging to the abdominal viscera. These opposite opinions were espoused by Sydenham and Hoffmann, and each of them has found advocates among distinguished writers of the present time.

Sydenham, as we have before observed, considered hypochondriasis and hysteria as closely analogous, or rather as modifications of the same disease, depending merely upon sex. He says, that "the disturbed or variable disposition both of mind and body which prevails in hysteric and hypochondriac subjects arises from a disorder of the animal spirits, or from an inordinate motion of the spirits."—"The spirits," he says, "which are subservient to the mind are, in reality, composed of the finest particles of matter, and border upon immaterial or spiritual beings." Sydenham's expression, "a disorder of the animal spirits," translated into the medical phraseology which is current in our own times, is well known to mean a disordered state in the functions of the nervous system. In connexion with this opinion as to the nature of the disorder, the author remarks that it occurs to those whose minds, or rather whose nervous systems were "originally weak or have been rendered so by a long train of disorders, or their long continuance."

Hoffmann maintained the opinion that hypochondriacal maladies proceed originally from disorders of the stomach and intestinal canal, from irregularities in its peristaltic action, whence ensue dyspepsia, flatulence, colic pains, spasms, and all the local symptoms which gave to the disease the name of hypochondriasis. The general disorders of the nervous system are supposed by this writer to depend on sympathy.

The opinion which ascribes to hypochondriasis a local origin has been reduced to a more definite form by modern writers. M. Louyer Villermay, in his treatise on nervous diseases, maintains that the primary seat of the complaint is in the abdominal viscera, and especially in the stomach. Here, according to Villermay and many who have adopted his opinion, the disease consists in a morbid state of the nervous structure and of the vital properties of the parts, and chiefly in an excess of their organic sensibility, an expression which belongs to the school of Bichat. The disorders which affect other organs and nearly the whole animal economy in hypochondriasis, are the results of sympathy with the morbid condition of the nervous structure connected with the gastric system.

M. Broussais and his followers modify this theory according to their peculiar and favourite doctrines. The disease, according to M. Broussais, is seated primarily in the coats of the stomach, but it is not a merely nervous affection. It is the same state, or analogous to the same morbid state, from which so many other manifestations of disease in various parts of the system arise; namely, a chronic inflammation of the mucous membrane of the stomach. From the peculiar condition of this membrane with respect to its vascularity, arises its morbid sensibility, and from sympathy of other parts of the system ensue all the multiform phenomena of hypochondriasis.

M. Georget has strongly opposed the opinion of those who place the primitive seat

of hypochondriasis in the abdominal viscera. In his work entitled "*Physiologie et Maladies du Système Nerveux*," he has investigated this subject, and has deduced from his own observations, and from facts reported by various authors, the following inferences:—

1st, That the characteristic phenomena of this disease refer themselves to the head. 2dly, That the other symptoms which sometimes belong to cases of hypochondriasis are not constant: thus we find that there are some cases in which palpitation of the heart has been remarked; there are others in which no remarkable derangement in the digestive processes has been observed. 3rdly, That almost all the exciting causes of the disease are such as are known to exert their influence directly on the cerebral functions. 4thly, That the most efficacious methods of treatment are moral remedies. From these considerations the author has drawn the conclusion that hypochondriasis is a primary affection of the brain.

It is impossible to give due attention to the arguments adduced by M. Georget on this subject without being aware that they have considerable weight. And yet the inference seems rather strongly drawn when we advert to the fact admitted on all hands, that no disease whatever has been traced with certainty in the brains of hypochondriacs. It must be taken into the account that morbid causes may, and do occasionally, act through the intervention of the brain, and induce disorders in other parts of the system much more real and considerable than the derangement occasioned, *in transitu*, in the brain. A man may receive some afflicting intelligence just before he is going to dinner, which may so spoil his appetite that he cannot eat. The function of the stomach is here impeded and deranged; not so that of the brain, although the impression is undoubtedly communicated through the instrumentality of the brain. In like manner trains of morbid causes may bring on repeated and at length habitual derangement in the functions of the alimentary canal, and of all the parts connected with it in structure and operation. These causes act through the instrumentality of the brain, but they are not productive of actual disease in the structure at least of that organ.

These considerations throw light on some of the theoretical questions connected with hypochondriasis. They tend to explain, so far as the analogy of facts occurring in the animal economy affords explanation, the circumstance that disorders in the natural functions, and particularly in those of digestion, arise from causes acting on the nervous system, and this without necessarily involving the supposition that there is disease actually seated in the brain and nervous system. The consideration that hypochondriasis is a disorder frequently, perhaps chiefly in its most aggravated forms, arising from the influence of causes which act, in the first place, upon the mind and on the brain, is therefore no adequate proof that the brain is disordered. The condition of the sensitive

and intellectual powers, which are uninjured in this disease, seems to afford a presumption on the negative side of this question. Still, when we take into the account the mental dejection of hypochondriacs, the habitual state of their spirits, and the trains of morbid feelings, of painful sensations which torment them, we can scarcely refuse to admit that some unknown deviation from the healthy and natural state of the cerebral functions lies at the foundation of their ailments, though it is remote from organic disease, and of a kind of which we can form no conception. Many of the phenomena which accompany this disorder would lead to the opinion that the principal deviation from health and the natural state of functions is situated in some other part of the nervous fabric rather than in the brain. They might be thought referable to the system of ganglions in connexion with the great sympathetic, or to what has been termed the nervous system of the viscera or of physical or organic life; since in this is the immediate centre, as it appears probable, of that peculiar property or influence termed organic sensibility in the stomach and other abdominal viscera. But phenomena involving consciousness and affections of the mind can hardly be confined to this part of the nervous system; the brain must participate in the morbid disposition; unless we could persuade ourselves to believe, with Bichat, that the feelings or pathemata have their proper seat in the ganglionic apparatus.

We shall close this part of our subject by adverting to a circumstance which confirms the conclusion that hypochondriasis is a disease of the nervous system rather than of the digestive organs themselves. It is the fact that the complaint is in some instances suspended through long intervals of time, during which the individual subject to it is in perfect health. We have known hypochondriasis to attack the same person several times during his life. A gentleman, previously healthy, active, and vigorous in mind and body, temperate, and regular in all his habits, became, without any assignable cause, low-spirited, anxious about his health, fancying that he was in imminent danger of various diseases of which he could trace slight and evanescent symptoms in his own feelings. He then began to complain of indescribable sensations about the stomach, burning pains in the epigastrium, flatulence, sinking, internal weakness; of pressure on the brain, and various symptoms of distress referable to the head; in short, of nearly the whole train of symptoms which characterize the most complete examples of hypochondriasis. These complaints molested the unfortunate sufferer for several months: no remedies appeared to be of any service. At length the symptoms disappeared and he regained perfect health, which he enjoyed for an interval of several years. During this period he bore no trace of any disease in the digestive organs. On the contrary, all the functions of physical life went on in a perfectly regular way. The attacks of his disease have recurred several times, and with the depression of spirits all the dyspeptic

symptoms returned. It might, indeed, here be a question, whether the return of gastric and enteric disorder brought with it the recurrence of nervous symptoms, or conversely, whether the relapse into disease of the nervous system was the occasion of renewed dyspepsia. The latter supposition is by far the most probable. Habitual disorders of the digestive functions are not frequently observed thus to cease altogether, and to recur without any distinct and perceptible causes. They do not leave their victims for some years in a state of perfect immunity from their influence, and attack him again in renewed and distant periods, while this is conspicuously the case with complaints affecting the brain and nerves: cases like that which we have described seem to approximate hypochondriasis to the class of disorders affecting primarily the nervous structure. They are incompatible with the supposition that chronic disturbance of the alimentary canal constitutes the whole essence of the disease.

But although it seems to be sufficiently evident that the actual seat of hypochondriasis, or the part of the organised fabric on the disordered state of which its characteristic symptoms depend, is the brain and nervous system, yet it cannot be doubted, on a consideration of the predisposing causes, that the latter in some cases exert their primary influence on the state of the abdominal viscera. Severe and long-continued disorder of the digestive organs lays the foundation for hypochondriasis; as similar influences occasion other diseases of the nervous system. As long as the mind is unaffected, the complaint may be considered as simple dyspepsia, and the whole of the disease may be regarded as confined to the digestive organs; but when low spirits and dejection are manifested, and hypochondriasis properly so termed exists, the disease must be supposed to have involved the nervous system, and in some degree the brain.

Treatment.—The treatment of hypochondriasis would be easy and probably in most instances successful, if it was taken up on rational principles from the commencement of the disease or early in its course. This seldom happens to be the case. It is rarely that hypochondriacal patients apply for the advice of a physician until the failure of a variety of remedies administered by themselves drives them to seek for aid likely to be more availing. When such an application is made, it is generally found that the patient has been a great reader of medical books; that he has repeatedly experienced in his own person the effects of every specific drug reputed to restore the functions of the liver and the chylipoietic system. It will often be found impossible to prescribe any remedy which has not already been tried, and given up in despair. Under such circumstances, the wisest course a physician could pursue, would be to repeat the precept of Montanus, often cited with applause, "*Fuge medicos et medicamenta, facillique convalesces.*"

The treatment of hypochondriasis should be divided into two departments, the dietetical or

moral, and the pharmaceutical. Of these the former is by far the more important, whether in recent or inveterate cases.

The first indication which common sense points out for the relief or cure of hypochondriasis, and the beneficial tendency of which is confirmed by experience, is to remove the causes of the disease by laying aside the habits, and as far as possible reversing the moral influences which have occasioned it. Change of scene, a removal from customary occupations by travelling, is the best method of ensuring this object. In the good old times, when physicians had a double hold on the obedience of their patients, the monkish practitioners had an excellent resource in prescribing for hypochondriacs a pilgrimage to the tomb of St. Jago, or the shrine of the Three Kings; but when their patients had lost all faith in the relics of Melchior, it became necessary to substitute other expedients which are not always quite so innocent. The most popular of these has been a resort to mineral springs; Hoffmann extols the waters of Schwalbach and Pymont. Various medicinal springs have afforded a pretext for advising sick persons to remove from home, and out of the influence of circumstances which created and fostered their disease. The physician who has hypochondriac persons under his care will avail himself of those means for fulfilling the indication above suggested, which may best accord with the circumstances and the prejudices of his patients. Continued travelling has the best effect, and is on many accounts preferable to an abode in any one place. Even the accidents of diet and lodging to which travellers are exposed are often productive of benefit to patients of this class: and when such circumstances produce temporary disorders of a different kind, as rheumatism, colds, slight bowel complaints, minor evils of this description are found to take off the attention of the patient from his habitual malady, and even tend to introduce, when they begin to abate, a better state of health and spirits. A gentleman who had been for many months labouring under great nervous susceptibility, dyspeptic, and unable to take food without producing great excitement and distress, set out in this state to make a journey in the south of Europe. He was seized on his way with diarrhoea, which was kept up by the acid cookery and wines of France, and continued for some weeks. Instead of increasing his principal malady, these accidents materially lessened it, and even before the new disorder entirely ceased, all the old series of complaints, both of the digestive functions and the spirits, were in a great measure cured.

As the effect of remedies in these instances depends not less on their influence on the mind than on the body, patients should be advised to go to places where their attention is likely to be occupied; this must be determined by circumstances.

Habitual and regular exercise is very conducive to recovery from hypochondriasis. Sydenham says, "the best thing I have hitherto

found for strengthening and cheering the spirits is riding on horseback some hours every day." He gives an instance of the efficiency of this remedy, in a "learned and reverend prelate, who, having applied himself too intensely to his studies for a long time, was at length attacked by a hypochondriac disorder which destroyed his digestion." After trying various remedies in vain, when reduced to great weakness by a colliquative looseness, he at length consulted Sydenham, who "immediately judged that it would be useless to order any more medicines as he had taken so many already, and, therefore, advised riding on horseback, directing him to take only such short journeys at first as he could bear without fatigue." "I entreated him," says Sydenham, "to continue it every day, to lengthen his journeys by degrees, and not to mind either meat, or drink, or the weather, and to take up with such accommodations as he met with on the road like a traveller. In short, he continued this method, till at length he rode twenty or thirty miles a day, and finding himself mended in a few days, he was encouraged by this wonderful success to continue in the same course for several months, in which space of time he rode several thousand miles. He was at length not only freed from his disorder, but became strong and brisk."

When the patient cannot ride on horseback, some other mode of exercise must be substituted. Walking is the most advisable, if the strength admits of it. Even females, when labouring under hypochondriasis, have derived great benefit from the practice of walking several miles every day, and by constantly observing the rule to do so when not prevented by intemperate weather.

The most effectual, however, of all rules for the cure of hypochondriacal patients is to withdraw them from studies, or pursuits, or habits of whatever kind, which may have been connected with the formation and development of their disease. If this maxim cannot be fully acted upon, which will unfortunately happen in a great number of instances, it must ever be borne in mind, and followed to the utmost limit which the circumstances of the invalid will admit. In all cases it must be remembered that much depends upon keeping the mind as much as possible agreeably and actively engaged. Irreparable evils may ensue from allowing the patient to sink into a state of mental vacancy and despondency, and to brood on his own uncomfortable feelings.

Something may be contributed towards the cure of hypochondriasis in many instances, and perhaps in all towards its mitigation and the relief of symptoms, by medicinal remedies. The choice and mode of administering these must depend upon the state of gastric and intestinal disorder with which the other ailments of the system are complicated. It will be well to bear in mind Broussais's theory of the disease, which is not without foundation in truth. If gastro-enteritis, or an inflamed or highly irritable state of the mucous membrane exists, of which there are frequently indications

more or less strongly marked, the case must be treated accordingly. All stimulating remedies will then be improper, and the regimen most likely to prove beneficial will be the antiphlogistic. An attenuating diet, with semi-fluid farinaceous nutriment and cool drinks, the use of mild injections and the most gentle laxatives for the purpose of regulating the bowels, the occasional application of leeches to the abdomen, warm bathing, will be the principal means of relief. When the dyspeptic maladies are without any inflammatory combination, and allied to atony or want of strength and action in the alimentary canal, warm purgatives, combined with bitters, aromatics, and the drugs termed antispasmodic or nervine, are most serviceable. Rhubarb, or infusion of senna and gentian, with some aromatic tincture, may be given daily or occasionally; with them alkaline or neutral salts may be combined according to circumstances. Aloetics, and compounds containing other resinous purgatives, may be added if necessary, and combined with assafetida or the galbanum pill. The remedy which agrees with the greatest number of flatulent and dyspeptic persons for the longest period is composed of a drachm of powdered rhubarb in half a pint of warm peppermint water.

Tonic remedies are used with advantage in some cases of hypochondriasis; and of the class of drugs so termed, the sulphate of quinia and the sulphate or subcarbonate of iron are the most efficacious. The subnitrate of bismuth may almost be considered as the sole remedy of the kind in cases attended with gastralgia after eating, and with pyrosis. It may, perhaps, be superfluous to observe that all the remedies of this class are highly injurious in cases attended with a state of the intestinal canal bordering on gastro-enteritis.

(J. C. Prichard.)

HYSTERIA.—Hysteria is a name commonly given to certain paroxysms of disorder occurring in peculiar constitutions, and generally in females; but in its full signification comprehends several peculiarities of a permanent character, as well as peculiar phenomena of occasional occurrence not amounting to the hysteric paroxysm. The latter phenomena sometimes appear singly, and sometimes in connexion with morbid actions not hysterical, but to which they impart a peculiar or hysteric modification. Thus defined, and the definition will be found of practical application, we may almost admit without qualification the remark of Sydenham, that hysterical disorders constitute one-half of all chronic distempers.

The circumstances of the hysteric paroxysm may in part be described from observation; but some of them are only perceived by the individual affected. Of the latter kind is the sensation of a ball or solid body suddenly perceived in some part of the abdomen, and usually in the left iliac region, or in a situation corresponding to that of the sigmoid flexure of the colon. It is probable that accurate observation would detect a circumscribed swelling or ful-

ness in that situation when the sensation comes on; but, both on account of the short duration of the symptom, and for other reasons easy to be imagined, this fact is generally taken on the testimony of the patient. A kind of vermicular motion of the abdominal muscles, and the sudden elevation and depression of the abdominal surface have been observed. There are, also, some precursory symptoms which are very troublesome to the patient, but not very easily described, concurring to produce what is called a *general* uneasiness and oppression; together with the more distinct symptoms of stiffness about the larynx, headach, and cramps. M. Georget says that the hysteric patients in the hospital of the Salpêtrière are so well accustomed to take warning by these precursory symptoms as never to be seized unexpectedly: they go to bed and are tied down until the fit is over.

The sensation of the ball, or globus, is described as ascending to the stomach, and then up the chest to the neck, becoming fixed in the throat; and to this sensation physicians have given the name of *globus hystericus*. In some persons who are liable to it on particular occasions, and in others who are occasionally affected with violent hysteria, the paroxysm of hysteria may end here. But in many, whilst the sensation itself is very distressing, it is attended with a sense of coldness and stiffness in the legs or in the trunk of the body, a depression of spirits, noise in the ears, and vertigo; and to these symptoms succeeds a temporary loss of sense and consciousness, and of command over the muscles of voluntary motion, which are either motionless, or violently and involuntarily agitated; the arms and legs being most generally affected, in short but repeated paroxysms, with vehement struggles, during which one of the hands is frequently struck on the breast, or the head lifted up and struck violently against the bed or the floor, or the patients tear their hair or otherwise injure themselves. Whilst these attacks last, the action of the heart is generally vehement, subsiding at intervals, but becoming again excited when a new paroxysm is coming on: the carotids are seen to beat strongly, and the veins in the neck swell. The face is flushed, and the skin is hot. The muscles of respiration are in almost every case especially affected; the patient breathes slowly, deeply, and as if by sudden impulses; or sighs profoundly, or sobs heavily, or cries or laughs immoderately and without meaning. Violent expiratory efforts are made, seemingly opposed by spasmodic action of the glottis;* the hands are forcibly applied to the throat, as if the patient felt a painful spasm there, and suffocation was impending: sometimes the epigastrium seems to be the seat of intense suffering, and is rubbed or even violently struck by the patient. Some patients bite their hands or arms, or those of

* Emphysema has sometimes ensued; supposed to proceed from the air being forced through the cellular tissue and mediastinum. See the article **EMPHYSEMA** in this volume, p. 16.

the unguarded bystanders. Occasionally, the bladder is affected with irregular action, and pale urine is copiously ejected.

Of a paroxysm of this kind the duration is uncertain; varying from a quarter of an hour to several hours. The recovery from it is often sudden and complete; a flood of tears, a burst of laughter, or a cry like that of one suddenly awakened, frequently ends it; or the patient, apparently exhausted, sinks into a state of quietude from which the recovery may be either sudden or gradual. The patient is sometimes unconscious of what has been going on around her, but is not unfrequently able to repeat what has been said by the assistants during the fit; a circumstance which not only suggests certain cautions to the practitioner, but has been made use of in the cure of this troublesome malady.

After such an attack, there is in some instances a temporary impairment or loss of voice, or of some of the muscles of voluntary or involuntary motion, as a paralysis of the arm, or of the bladder. In general, the only consequences are a degree of fatigue, and headache.

Such is the common form of the hysteric paroxysm; but it is subject to varieties, the distinction of which is on some occasions extremely important to the medical attendant, as well as to the patient. "This disease," says Sydenham, whose description of it is very minute and accurate, "is not more remarkable for its frequency than for the numerous forms under which it appears, resembling most of the distempers wherewith mankind are afflicted. For in whatever part of the body it be seated, it immediately produces such symptoms as are peculiar thereto; so that unless a physician be a person of judgment and penetration, he will be mistaken, and suppose such symptoms to arise from some essential disease of this or that particular part, and not from the hysteric passion."* Unusual forms of sudden illness, or unexpected circumstances in the course of disorders familiar to the observers, often excite much alarm until their hysterical character and origin are recognized. Every form of hysteria, however various and transient, is, therefore, sufficiently important to deserve the attentive observation of the student of medicine: nothing else can lead to their ready recognition in future practice, where a mistake may prolong needless anxieties, and be even of serious consequence both to the practitioner and patient; affecting the safety of one and the reputation for discernment of the other.

The ordinary varieties of the hysteric paroxysm chiefly consist of certain limitations of the preceding phenomena, with more or less aggravation of their severity in the parts or functions which happen in each case to be their seat. In many cases the symptom of globus, commencing in the abdomen, is accompanied with an incredible development of air in the intestines, which produces great distention and oppression, induces dyspnoea,

various pains both in the abdomen and chest, and a sense of constriction in the throat, with irregular breathing or crying; but does not go on to convulsions of the voluntary muscles, nor to insensibility and complete loss of power. These attacks come on, perhaps, a few hours after dinner, and last for two or three hours: an immense quantity of air is at length got rid of by eructation, and then all the symptoms subside. If the eructation does not take place, the patient complains of severe anguish in the situation of the stomach; or, becoming too much oppressed to speak, rubs the epigastrium vehemently with her hand. There is evident distention of the upper part of the abdomen, which may, without eructation, gradually subside; and there is often great commotion in the greater part of the intestinal track, productive of violent rumbling, sometimes with alternate protrusion and subsidence of different portions of the abdominal parietes. But whilst the distention remains, other symptoms may supervene, apparently excited by it; as disturbance of the circulation in the form of palpitation; determination of blood to the head, producing severe pain, sometimes with vertigo, flushing of the face, suffusion of the eyes, and some degree of mental oppression or torpor; all of which seem in certain cases to be secondary to the gastro-intestinal distention or tympany. To these symptoms, or to a part of them, succeed in other patients all the other circumstances of the hysteric fit; the muscular agitation, the loss of the sensorial and muscular power, and the consequences of these accidents.

Certain obstinate cases of indigestion in females are in reality hysterical. The patients complain of much oppression after eating; the oppression sometimes amounts to temporary stupor, with a feeling of inability to move, which yields, however, to strong efforts or excitement: occasionally true hysteric symptoms, globus, disturbed breathing, convulsions, and insensibility, succeed, and even in the lighter forms give relief.

The irritability and disorder of the stomach in hysterical subjects is in some cases manifested by the occurrence of vomiting; the matter vomited being green, or black and like the grounds of coffee. (*Whytt.*) We have never known hematemesis occur in the fit, as mentioned by Georget. The appetite is very irregular, often craving things hurtful, and at hurtful hours, as meat, cheese, cucumber, &c. at night, and then only. Great depression of spirits is generally conjoined with these states of gastric disorder, and proneness to tears.

As no organs of the body sympathise more with the nervous system under the various impressions made upon it than those concerned in the function of respiration, so the hysteric constitution is particularly liable to disturbances of this function. The intense susceptibility of such a constitution leads to the occurrence of hurried breathing when even slight emotions are experienced; and to sighing, sobbing, and violent inspiration and expiration when any of a more powerful kind are excited. There

* Swan's Translation, Lond. 1749. p. 370.

are patients in whom hysteria manifests itself chiefly by these irregularities, which are more or less induced in different individuals; in some very readily, being in them only transient in their existence; in others with more difficulty, and, when produced, evincing more violence and less facility of being controlled. The irregularity of breathing, occurring in paroxysms, and induced by accident, sometimes very closely simulates asthma; and this solution of paroxysms apparently asthmatic may be sought for with success when they occur in young persons rather than in older, and in females of an irritable temperament: the apparent asthma will often be found co-existent with other and less doubtful hysterical phenomena, and will admit of considerable or of permanent relief from what are called anti-hysterical remedies.

A loud, disturbing, dry cough, almost resembling a bark, is so peculiar to hysteria that it might well be called the hysterical cough. It occurs in paroxysms, and is brought on with much violence by slight mental impressions, as by an unexpected visit from a friend, or the approach of the medical practitioner. Individuals thus affected are commonly subject to all the other symptoms of hysteria. In some patients the hysterical attack comes on with an apparent spasm of the glottis, and a croupal respiration; in others it assumes the form of common asthma. Dr. Ferriar speaks of an hysterical hemoptysis, relieved on the super-vention of the fit; but this, and the copious expectoration with profuse night-sweats, described by most of the older authors among the troubles of hysteria, we have not observed.

We were not long since in attendance on a patient of about thirty-five years of age, in whom there was a deficient, although regular, performance of the uterine functions, and in whom at each monthly period there was sudden suppressio menses *following* the appearance of what the patient called her asthmatic complaint; of which, however, the symptoms were not those of regular asthma. They occurred at such times, and for a week or two afterwards, every other day, commencing with great coldness of the hands and feet, and headach; to which succeeded a peculiar difficulty of breathing, lasting all the day, and going off at night. The breath was not, in these attacks, as in asthma, suddenly drawn in and protractedly and sonorously expired, but the inspirations and expirations were short and panting, about forty inspirations being made in a minute; the pulse at the same time being very low and weak, and not more than *twenty* in a minute. There was a sense of weight, amounting to pain, in the sternum; pain in the region of the heart and between the scapulæ; and fulness and pain in the head; the face was flushed, and the eyes were protruded; a thick expectoration was described as sometimes inducing relief. We mention this case, however, chiefly because the symptoms of failing pulse, coldness, and orthopnoea, often led the friends of the patient to think that she was dying; and yet the complaint

has now for several months entirely disappeared under treatment calculated to improve the general health, to regulate the uterine functions, and to allay the great susceptibility of the nervous system. We were informed that in two or three members of the patient's family consumption had supervened on similar symptoms; but all medical men are aware of the doubtful nature of this kind of evidence.

In no class of patients is an irregular pulse more frequently observed: when it is first felt it is perhaps found to be very rapid; after ten or twelve beats this quickness subsides, but soon comes on again; and these alternations appear to be continual. Slight causes produce a more permanent excitement, during which the practitioner may be much misled; in a few days the excitement will be gone, and the pulse will be found languid and weak. If these caprices of the circulation are embarrassing when no serious disease is present, they become much more so in affections themselves important, as in acute inflammations, or in the commencement or course of continued fevers. Among the many modifications of the ordinary symptoms of fever by the hysterical constitution, we have remarked a singular inequality between the arterial pulsations and the respiration; the pulse being sometimes as slow as the ordinary respiration, and the respirations sometimes advanced to the ordinary rapidity of the pulse. These circumstances seem most common during the first three or four days of the complaint, and, occurring in any other than hysterical patients, would furnish ground for a very unpromising prognosis.

It is seldom that the hysterical respiration is unaccompanied with irregular or with hurried and vehement action of the heart; and it is particularly important to remember that an irregular as well as a very frequent pulse may be occasioned by many causes in an hysterical patient; by temporary causes, and by diseases unconnected with structural affection of the heart. We have known delicate females, during convalescence from a fever, repeatedly bled for palpitation really dependent on weakness, to the lasting impairment of a constitution already morbidly susceptible. It is to be said, however, that mere hysterical palpitation is occasionally attended with so much disturbance in the impulse as well as in the rhythm of the heart, as to make its resemblance to structural alteration of the organ such as even the stethoscope fails at once to disprove: the practitioner's chief assistance in the diagnosis of such cases must arise from his observation of the transient and occasional character of the symptoms, and from his knowledge of the patient's constitution.

The pulsations of the aorta are also in some hysterical cases greatly disturbed, principally as regards their force, which becomes so much increased that the patient complains much of the beating in the abdomen, and the practitioner himself is harassed with the fear of organic disease. In the course of fevers we have found this affection existing in a very remarkable degree, generally together with other irregular

symptoms; and the pulsation has been so vehement, and within a space so circumscribed, as very precisely to convey to the hand the sensation of a large, defined, pulsating tumour.

In different individuals, and in the same individual in different attacks, the disorder to which the name of hysteria seems justly given, (because such individuals always shew more or less of the hysteric character, and their various affections are more or less obedient to what may be called anti-hysterical remedies,) assumes shapes so various that it would be in vain to attempt to describe them all. There seems to be no function or organ in which irregularity may not be induced in an hysterical constitution; the irregularity occurring, and disappearing, or being overcome, with so much suddenness as to create a perfect analogy between such affections and the commonest forms of the disorder.

Thus in some cases the hysteric fit consists of temporary and partial loss of power, or a palsy of some of the voluntary muscles; sometimes of those of one limb; sometimes of those of the voice; and sometimes of all the voluntary muscles of the body, and the patient falls into a state of coma; is insensible; the face is flushed; the pulse beats regularly, even firmly; the respiration is calm and profound; and neither the sensibility nor the power of voluntary movement return for several hours. These cases somewhat resemble apoplexy, and cases are on record in which they have gone on to it: generally, however, they do not require active treatment. In the first case of this kind which we ourselves witnessed, a young woman fell down in the street, and we were at a loss to account for what seemed to us the rash prophecy of an experienced physician that she would recover in a few hours. These cases are mentioned by Whytt.* "Many hysteric women," he says, "are liable to be seized with faintings, during which they lie as in a deep sleep; only their respiration is so low as scarce to be perceived. Others, along with faintings of this kind, are affected with catchings and strong convulsions." A similar state may succeed to the more violent phenomena of hysteria;† and the functions of the heart and lungs may be so seemingly suspended, and the coldness so great, as to present the image of death. Pliny has recorded a case in which this state lasted seven days; and Lancisi mentions one in which a young woman recovered whilst the funeral service was performing. A more striking case occurred to Vesalius, who began to dissect a supposed dead body, to which life returned with the first application of his scalpel. Of the same kind, probably, was the case of a Lady Russell, in the early part of the last century, whose funeral having been postponed for a longer period than usual, afforded time for her happy

recovery, which took place while the bells were ringing for prayers; the supposed dead person exclaiming that it was time to go to church. Cases of this kind constitute M. Louyer Villermay's *third* degree of hysteria;* we see no shadow of reason for applying to them the name of hypochondriasis, as some have done;† perhaps they would be more properly classed under the head of syncope.

Instead of these comatose forms, there may be rigid spasm of several of the muscles, especially of the limbs; the legs and arms may be stretched out, the fingers strongly compressed on the palms, and the toes as strongly drawn up. This state may be varied by an occasional start, accompanied with a short and forcible expiration, and at length give way instantaneously, often to proper remedial means. The spasmodic state is described by credible authorities as having in some cases lasted for several weeks.

That a disorder capable of producing so many irregularities of function should occasionally produce a counterfeit representation of various maladies, and should singularly modify the course of others, is not surprising; but the deception is not limited to functional affections, being often extended to the imitation of organic changes. Diseases of the stomach, of the liver, of the intestines, of the bladder, and also of the heart, the lungs, and the brain, have thus been supposed to exist.

Some of the inconveniences which, in hysterical patients, are to be referred to a depraved state of the stomach and bowels, with great distention, have already been mentioned. It is to be added that prolonged constipation, continuing even for weeks, and sometimes the opposite state of obstinate purging, occur in such cases.

Hysterical women will complain of symptoms of obstruction of the gullet, of the rectum, and even of the vagina: and the urinary system is in them much and variously affected. Spurious symptoms of calculus in the kidney, the ureters, or the bladder, may arise and be of little consequence: dysuria, or even a suppression of urine may occur; but more frequently, as in other instances of nervous disturbance, there is an unusual flow of it, and sometimes a kind of false diabetes. These circumstances make such patients an easy prey to quacks and pretenders in medicine, by whom we have known them to be persuaded of the real existence of scirrhus formations, or other serious diseases with which they were not in reality affected.

Jaundice has supervened, in some cases, on hysteria. We have known pale and feeble women who were liable to acute and apparently spasmodic pain in the situation of the liver, and in a situation corresponding to the course of the ureter: these cases were connected with uterine irritation, and had been vainly subjected to various remedies administered for biliary and for

* Observations on the Nature, Causes, and Cure of those Disorders which have been commonly called Nervous, Hypochondriac, or Hysteric. Edinb. 1765. Pages 64 and 86.

† *Louyer Villermay*, *Traité des Maladies Nerveuses ou Vapeurs*, &c. Paris, 1816.

* *Dict. de Méd.* Article *Hysterie*.

† *Hoffmann*.

renal disorder. Such cases are among the many in which bleeding and purging, and salivation, the ready instruments of coarse and indiscriminate practitioners, are daily productive of irreparable mischief.

Pains, of variable severity, often very severe, are among the distresses of the hysterical. A fixed pain in the forehead, and generally over one eye, which has been termed *clavus hystericus*, the sensation being that of a nail driven into the forehead, is very common. It is one of the many attendants of uterine irritation, to which, however, hysterical affections have been too exclusively attributed: we have known it disappear entirely during pregnancy, and again become troublesome a few months after delivery; and it is generally preceded by a sense of weight in the head, and an oppression in the throat; and is sometimes relieved by a flow of tears.

More severe and general invasion of pain in the head may come on, with much of the character of phrenitis; with senses morbidly acute, and small and rapid pulse; but without acute delirium, or red and injected eyes: the face also is very pale, and there is much hysterical agitation.

There is another painful affection, often also, we believe, connected with irregularity in the uterine functions, and attended with constipated bowels, in which the patient's chief suffering is fixed in the left side, below the mamma, and above the situation of the spleen. There is most acute tenderness without swelling; the patient cannot lie on the affected side; and the disease resists for months, sometimes for years, all varieties of treatment. Although we have said that these cases are often connected with uterine irritation, the depraved state of the appetite, occasional sickness, and obstinate sluggishness of the bowels, make us doubt the propriety of laying great stress on the uterine disorder. In these cases, or in most of them, there is some pain of the back, referred to the lowest part; and there is a tenderness of the spine, confined to the dorsal region. The pain of the sacrum is a common complaint with females in whom the uterus is unhealthy, and yet who are not hysterical, and who have no tenderness about the dorsal vertebræ; and neither the dorsal tenderness nor the sacral pain are present in many of the examples of the *clavus hystericus*, even when most clearly arising from uterine irritation. These circumstances, which we have very carefully verified, are incompatible with the uterine theory of diseases which we shall have to notice when speaking of the *causes of hysteria*.

The female breast is in some hysterical cases the seat of much pain, and is also enlarged and hard; so that the patient dreads the occurrence of cancer, although at an age when the practitioner has no apprehension of it. Dr. Darwall mentions a case, in his remarks on spinal irritation, where this was combined with tenderness of the three superior dorsal vertebræ, and all the symptoms were relieved by cupping. Pains of the limbs are not unusual, and they are now and then united with an impairment of

the motions of the hip or the knee, leading to a suspicion of disease of the joints. In very young but precocious females we have seen this curious complaint combined with strange affections of the sight and of the voice; of which one of the most remarkable instances that we remember occurred some years ago in the Edinburgh Infirmary: the subject of it was a girl of thirteen, and the lameness and partial blindness, and an appearance of fatuity, all disappeared under a steady application of Dr. Hamilton's purgative treatment.

Sudden and violent attacks of pain in the abdomen, with excessive tenderness of the surface, a quick pulse, and many symptoms which may be mistaken for those of peritonitis, sometimes take place in hysterical young women, yet without inflammation. It is to be observed that the tenderness, in all cases of hysterical pain, is most felt on slight pressure, and is often evinced on the gentlest touch; which is not commonly seen in instances of internal inflammation.

The most severe examples of colica which we have met with have been in hysterical women; cases of excruciating pain, not yielding entirely for many days, during a great part of which time the cries of the patient have disturbed the whole house. These cases have been denominated flatulent or hysteric colic. In these cases, if the extreme tenderness on slight pressure is present, firm pressure is borne much better, and perhaps gives relief: the tongue is often clean, or has not the whiteness so general in enteritis; there are also intervals of relief from suffering, during which the patient's voice is calm, and the pulse not much quickened, or is sometimes slower than usual, without any sharpness, and even very low. Such attacks are often relieved by the dejection of copious, dark-coloured, and offensive stools.

Inequality in the regulation of the animal temperature is another troublesome part of hysteria. Fits of coldness and of oppressive heat succeed each other; or the feet are cold and insensible to the hottest fire or to very hot water, whilst the head and face are burning, in which case there is commonly some delirium. A feeling of coldness running down the spine, which is familiar to nervous persons, is often present in the hysterical.

We cannot recollect to our mind a hysterical patient whose sleep was generally tranquil and undisturbed: many have complained of prolonged and distressing wakefulness, their nights being often passed in a state of perfect vigilia, and at other times rendered uncomfortable by restlessness and distressing dreams. Yet it has always appeared to us as remarkable, that, unlike epilepsy, the hysteric attack does not usually come on in the night, or after sleep.

Many pages might be filled with accounts of singular forms of disease, productive, according to the degree of information possessed by the attendants, of more or less wonder and perplexity, which have been observed in all ages, and which might justly be classed with hysteria. From the irritations occasioning mere rest-

lessness, yawning, and what are called "the fidgets," up to the most capricious and violent disturbance of different parts of the system, there seems to be nothing strange or odd which hysteria has not at times exhibited. Among these curious phenomena may be mentioned a disposition on the part of the patient to repeat some unmeaning syllables from morning to night, or during several hours every day; or, whilst lying otherwise motionless and seemingly insensible to outward impressions, to sing loudly and for a length of time a few particular notes, repeating them a thousand times. Pious ejaculations, hallelujahs, and snatches of hymns, we have thus heard vociferated to the excitement of a mixture of awe and amusement in those around the patient, who will sometimes seriously enquire whether the physician does not believe the patient to be bewitched.

Dr. Parry's notes* contain the case of a young lady of fourteen years of age, in whom menstruation had commenced a year before, and who, after being present at an exhibition of fireworks when but recovering from slight indisposition, complained of weariness and giddiness, and pain of head; on which ensued spasmodic motions of the hands and fingers, and convulsive actions of various parts, which continued for some hours. Two days afterward the attack returned, and, as she lay on her back, rather towards her right side, she threw the left arm and body backwards at measured intervals, exactly keeping time with two or three notes which she sang out with a strong and clear voice; and this scene was repeated every day from eleven to three at noon, and from eight to ten at night, leaving her much fatigued, after which she slept well. She was fond of music, and could both play and sing, but could assign no reason for the particular song so often repeated, but that "it was irresistible." These attacks were occasionally repeated for ten or twelve days more. When the treatment pursued began to take effect, the song began to disappear, but she was uncomfortable, or had an attack of headach, or cried and made pale urine at the usual hour of the attack. Dr. Parry succeeded in checking the convulsive motions by compressing the carotid artery: the patient was bled, leeches were applied, and purgatives and nitrate of potass and squill were administered.

The tendency of the phenomena of nervous disorders to return at stated intervals, although often observed, seems to have been forgotten in the instance of some of the most unusual forms, and cases of this kind have been erroneously classed, from the mere circumstance of the periodicity of the symptoms, with ague.†

Dr. Bright has given cases of hysteric hiccup, and of spasmodic exclamation, and of hysteric dysphagia.‡ In the latter case the introduction of the probang induced an hysteric fit,

which was immediately followed by hysteria in several females in the same ward; thus illustrating the effects of *imitation*, which we shall have to speak of among the causes of this affection.

The name of simulated pregnancy has been given to some cases of hysteria, in which the abdomen enlarges gradually, sickness occurs, and so many signs of an impregnated uterus are present, that time alone can solve the doubts they raise. The catamenia are suppressed, the breasts are tumid, and there is pain in the back. Mr. Tate says, of these cases, "in what this engorgement consists, I am utterly ignorant: that it is not a mere accumulation in the colon, I know; and that it is substantial, I am equally sure."* It is, we apprehend, a mixed state of vascular fulness and tympanitic distention.

Dread of water, the disengagement from the body of electrical sparks, the occurrence of spontaneous emphysema, and the phenomena of somnambulism, have been observed in the hysterical; and cases of misplaced *senses*, which are entitled to little credit. We have dwelt sufficiently on the anomalous forms of the disorder in some degree to prepare the inexperienced practitioner for the singular appearances which hysteria often assumes. The older writers, whose observations were often made in religious houses for the reception of women devoted to celibacy, have recorded other examples, some of which we shall have occasion to refer to.

We shall not pretend to give any explanation of the surprising revelations or presentiments, or shadows of coming events, which have been said at times to be associated with the hysteric paroxysm. When the small portion of truth which such relations contain is separated from the fancy, the fable, and the fraud with which it has been invested, it may perhaps be rendered intelligible by the consideration that extreme excitement of the brain may lead in these states of disorder, as in troubled and vivid dreams, to combinations of images, and to probable suggestions concerning the course of events past or to come, which appear to a sober and healthy mind, unacquainted with such wild excitement, as too extraordinary not to be supernatural. Concerning animal magnetism, connected as it is with this part of our subject, we shall only express our hearty disbelief of most of the circumstances related by its supporters, and our conviction that the rest admit of explanation without having recourse to the principle the magnetisers so anxiously desire to establish.

Amidst such general disorder, the nervous system being so frequently, perhaps so invariably involved, the functions of the brain often become deeply affected. Increased susceptibility to impressions, celerity of movements, and capriciousness of motives, strongly characterize the hysterical female: her countenance indicates the mutability of her feelings; and when the constitution is intensely imbued with these characters, the most amiable sentiments are seen to be readily converted into jealous and

* Posthumous Works.

† See the article CHOREA in the 1st vol. p. 415; a case entitled *Leaping Ague*.

‡ Reports of Medical Cases, vol. ii. p. 457; cases ccxi, ccxii, ccxvi.

fierce passions, and all sense of humanity to be lost in the gratification of cruel and remorseless impulses. Sydenham, whose industry and sagacity are equally discernible in all his writings, has left us a graphic picture of these effects, and his testimony will sufficiently assure the reader of their reality. "Upon the least occasion also," he says, "they indulge terror, anger, jealousy, distrust, and other hateful passions; and abhor joy, and hope, and cheerfulness, which, if they accidentally arise, as they seldom do, quickly fly away, and yet disturb the mind as much as the depressing passions do; so that they observe no mean in any thing, and are constant only to inconstancy. They love the same persons extravagantly at one time, and soon after hate them without a cause; this instant they propose doing one thing, and the next change their mind, and enter upon something contrary to it, but without finding it: so unsettled is their mind that they are never at rest." This description was perhaps intended by Sydenham to comprehend the hypochondriac character; and yet, although not to be taken as a general representation of the hysterical mind, we have seen it so exactly exemplified in the hysterical as to be greatly struck with the truth of this great physician's painting. Cases of this kind approach near to insanity; and, indeed, a mind subject to the violent agitations incidental to the hysteric constitution cannot be considered as perfectly sane. We would here beg to insert a caution to which the young practitioner cannot pay too much attention. We are inclined to think that cases of hysteria, in which the mind was principally affected, have occasionally been treated as cases of simple mania, and the patients placed in confinement with lunatics. Nothing more likely to have the most unfortunate effects upon the patient could possibly happen; and no care can be too great to avoid a mistake which would in all probability render such a case incurable and hopeless.

The disposition to dread the approach of disease on the occurrence of slight feelings of an unusual description has frequently been observed in those disposed to mania, and is a leading feature in cases of hypochondriasis: it is also seen in some instances of hysteria. The physician is hastily summoned as if to a severe disease, and finds no real cause existing for the patient's alarm. A morbid susceptibility of all parts of the nervous system disposes, in them, all parts to diseased, or at least to undue impressions; to false or diseased sensations, and to irregular or diseased actions. Any function consequently may, in the hysterical constitution, be readily disordered; as the respiration, the circulation, the digestion of food: any part may be affected with pain and the usual symptoms of confirmed disease; and, at length, the parts thus affected may really become the seat of inflammation or other disorder, and undergo a change of structure. For these ultimate results of hysteric disorder the physician should in all severe cases be prepared.

As the deeper shades of hysteria border upon or enter the confines of insanity, so the

lighter comprehend several varieties of constitution characterised by increased susceptibility, and in which, some time or other, it is found that peculiar impressions evoke some of the hysteric phenomena. With many of these cases the guardians of education are more directly concerned than the medical practitioner; and the principles of their management may be gathered from the valuable observations contained in the article *PHYSICAL EDUCATION* in the present work. It is quite certain that the unhappy temper and violent irritability of hysterical females, combined with their constitutional tendency to the hysteric paroxysm, is in some instances sufficient to bring on, almost at the will of the patient, attacks which occasion much concern to their relatives or friends: we have seen undoubted instances in which a temporary loss of muscular power, a singular diminution of the action of the heart, and an inability to speak, but without loss of consciousness, originated in the desire of a self-willed individual to distress the spectators, or to overcome opposition to some wayward desire; as if the wish to feign an attack brought on a real paroxysm. Frank mentions similar cases, and others against which it is very necessary that a young medical man should be on his guard.*

It occasionally happens, however, that individuals whose education has long been completed, and whose temper and intentions are blameless, are driven by the intolerable sufferings of a highly susceptible nervous temperament to consult a physician; who will be more likely to be of service to them in proportion as he regulates the treatment of them according to the principles of the prevention of hysteric paroxysms. Rank, fortune, and reputation are insufficient to counterbalance the evils attendant on such a temperament; and, unfortunately, those who are most subject to its distresses seldom possess the firmness and perseverance indispensable to a perfect cure.

Modifications of disease by hysteria.—It may be supposed that a disease capable of simulating so many others may modify some rather remarkably. The most important of its modifications are seen in the course of fever. Rivière, Baillou, and even Morgagni, entertained the idea of a distinct hysteric fever as a species; but M. Loyer Villermay justly considers such cases as having been nothing more than examples of anomalous symptoms belonging to fever. We have seen nothing in practice to make the opinion of the former authorities credible: it seems to have been purely founded on theory. But the incipient symptoms of fever, its progress, and the circumstances of convalescence, may be much modified by the hysteric constitution. Irregularity in the respective frequency of the pulse and the respiration; an hysteric fit, of the comatose description, ushering in the febrile stage; a disposition to delirium in a state bordering on sleep, yet in which the patient is conscious of what is passing around her; a very singular exaltation of the *tone* of the voice,

* *Præceps Medicæ Universæ Præcepta*, cap. xiv. § lxxii. 22.

without increased loudness; a state approaching to catalepsy, but with consciousness remaining; sudden and unexpected, but not always complete recovery; and transient attacks of mania; we have on several occasions observed: and in almost every instance in persons living an easy and indulgent life, and, with the exception of one or two cases in upper servants, seldom among the poor.

In the course of a severe attack of fever in a young lady at school, great alarm was one evening occasioned by the supervision of what was supposed to be *croup*. There was laborious breathing, a loud croupal sound, and great distress apparently existing in the throat, almost amounting to suffocation; and the patient was unable to speak. Similar attacks recurred every night for three or four nights, lasting for an hour or two. These gave place to paroxysms of severe spasm in the stomach, occurring with equal regularity; and these disappeared on the supervision of what might be termed *paroxysms* of sleep, which came on with a febrile exacerbation every afternoon: in the midst of cheerful conversation, intended to make the patient forget her sleep, she would drop instantaneously into a state of sleep the most profound, lasting however, generally, not more than a quarter of an hour, sometimes continuing about an hour. On awaking from this sleep the spasm of the stomach sometimes recurred, and there was occasionally a disposition to the croupal phenomena. This was a tedious and severe case, and excited great alarm in the patient's friends, although there was never any great appearance of danger in the estimation of a medical observer. On the importance of remembering that these and other odd accidents may occur in fever it is quite unnecessary to dwell. Few things are more gratifying to the physician than to be able, relying on his knowledge, to be calm and assured when all around him are in a state of agitation and dismay.

The patient who was the subject of the above case had been some months previously affected with *rubeola*: the eruption came out, and seemed to be disappearing at the usual period, when it suddenly broke out anew, and to such an excessive degree as to make it impossible to recognize the features of her face: whether or not this peculiarity was also connected with the hysterical constitution we cannot take upon ourselves to determine.

In another case of an hysterical young lady we have happened to witness two attacks of continued fever, with an interval of four years between them. On each occasion very severe hysterical symptoms have come on, recurring every day, or every other day, or observing longer periods, principally in the form of short spasmodic agitations about the chest and neck, followed by a disposition to crying, with more rapid agitation of the chest, apparently connected with irregular contractions of the diaphragm: a feeling of suffocation often ensued, sometimes with a temporary suspension of respiration, deep redness or blueness of the face, often only in spots or patches. The addition of such symptoms to the usual disorders of the

febrile state constitutes a state of extreme and complicated disturbance and suffering, in which it is difficult to distinguish the effects of the fever from the hysterical accompaniments. Pain in the head, pains in the limbs and back, difficulty in moving, costiveness, dysuria, and many other symptoms, exist in such cases at the same time; and there is usually much tenderness of the spine, sometimes with, sometimes without uterine irregularity.

It would be impossible to enumerate the modifications which may take place in other diseases: any unusual assemblage of symptoms, or remarkable inconsistency in their respective severity or order, may awaken inquiry, and will generally be found to depend upon some degree of the hysterical character in the patient. The development of hysterical symptoms in the course of other maladies is occasionally dependent on weakness, either produced by the continuance of the disease or by certain accidents in its progress, or by particular kinds of treatment. Thus, in the debility of the stage of convalescence from fever, and after hemorrhage, and after parturition, and after the employment of very free bleeding, the occurrence of unmeaning laughter or tears, and other parts of the hysterical attack, are not at all uncommon, and always require some attention to their cause.

Whether hysteria has supervened upon some other disease, mixing with and modifying it, or has been in any other way produced, it has a tendency, when severe, long-continued, or frequently recurring, to produce further mischief, and new complications. Inflammatory actions, for instance, take place at or near the extremities or origin of previously irritated nerves; or, as some authors have expressed it, the disease of the system of innervation becomes combined with disease of the vascular system; and morbid changes take place in the brain, spinal marrow, nerves, or some of the organs supplied by them. In the course of a long hysterical disorder, and yet more readily in the course of a fever in an hysterical patient, the tenderness of the spine may become excessive; and disordered sensations and impaired powers of motion will indicate that something more exists than mere irritation. These symptoms may disappear as the patient recovers strength; but they sometimes attain a degree of intensity requiring especial attention, and even inducing an apprehension of danger. The spinal tenderness in these cases is very different from that excessive sensibility to the slightest touch which some hysterical patients evince during the hysterical attacks, and which is of a very evanescent character, often alternating with, or perhaps accompanied by, an equally morbid sensibility of the limbs, or of the articulations.

Hysteria is one of the disorders of which the consequences are much less serious, as far as the life of the patient is concerned, than its more violent phenomena would lead an inexperienced observer to fear. It can hardly ever, perhaps, be considered as in itself fatal. The secondary diseases to which we have already

said it may lead may be fatal. Congestion or inflammation in portions of the brain may occasion death; or the patient may die apoplectic. M. Louyer Villermay has quoted a case of a young woman of fifteen, in whom a most violent hysterical attack ensued on the sudden suppression of the catamenia in consequence of terror. The paroxysm continued more than two days; *nothing was done for the patient's relief*, and she died on the third day, being only fifteen years of age. The patient had complained of a feeling of suffocation, as if a tight collar was fastened round her neck; the hypogastric region was tumid; she could not swallow; she was convulsed; the action of the heart was tumultuous; in short she had had every symptom of violent hysteria. On dissection, the stomach was found contracted, and strongly incurvated, (*fortement revenu sur lui-même*); the left cavities of the heart were empty, as were also the pulmonary veins and the arteries; whilst the right cavities, the pulmonary artery, and the veins, were gorged with black blood, chiefly coagulated. The cerebral veins and the sinuses of the dura mater contained much blood; but there was no appreciable alteration of the brain or spinal marrow, or their coverings, or in the nerves. The ovaries were very large and very firm, and enveloped in a partially transparent tunic, (*une sorte de tunique albuginée, mais transparente dans plusieurs points*). In the interior of the ovaries there was a large collection of round vesicles, filled with an abundant mucous fluid, which required for its escape the separate puncture of each vesicle.*

The same author is one of the very few writers on hysteria who have especially devoted a section to the appearances found in fatal cases. He adduces the testimony of Riolan, Blancardus, Binninger, Vesalius, Diemerbroeck, and Morgagni, as to morbid appearances in the ovaria more or less resembling those mentioned in the above mismanaged and most unfortunate case; without, however, concluding that such alterations, or any changes in the state of the uterus, are constant.

We spoke, some pages back, of the super-vention of jaundice on hysteria, but this, like the occurrence of phthisis, can only be looked upon as an accidental complication. It may sometimes, however, happen that the patient, worn out by the long continuance of the malady and repeated paroxysms and frequent agitations, may become peculiarly liable to the supervention of the last mentioned disease; or may become affected with a slow fever, the body gradually wasting, and the strength decaying, and a premature death at length ensuing.

But among the peculiarities of the hysterical constitution, are to be reckoned some unexpected recoveries from states which seem to furnish an utterly hopeless prognosis. Of such singular cases and their termination we generally have an outline in the expression which all must on some occasion or other have heard employed, that such a patient fell into an odd state, and

remained so for a year or longer; that nothing could be made of her case, and that at last she got better, nobody very well knew how or why. These curious reprieves are sometimes from what has appeared to be atrophy, or phthisis, or paralysis; but they have, we believe, occurred after a strong image had been presented of other incurable diseases and of impending death. M. Georget very properly guards the practitioner, therefore, against forming and pronouncing too hasty a prognosis in all cases of hysteria; observing that not only do such occasional recoveries sometimes unexpectedly take place, but that the course of diseases of a fatal character is often much more prolonged in the hysterical than in those of a different constitution.*

Hysteria in males.—We have met with a few instances which we consider to have been decided examples of hysteria occurring in males. The subject of one was a gentleman who had devoted himself with too great intensity to his studies, being designed for holy orders. After leading a life of great retirement at Oxford, and, in opposition to his temperament, of strict chastity, his mind became irritable, and he could not obtain refreshing sleep. On several occasions he was suddenly seized with violent sobbing, gasping, and anhelation, attended with a fear of immediate death by suffocation. During these attacks his face was flushed, the carotids pulsated strongly, and the heart was much disturbed; but he retained his consciousness. We were also acquainted, some years ago, with two gentlemen who were singularly intemperate in drinking, and in both of whom excess sometimes induced fits of sobbing and crying, with palpitation, a weak pulse, a loss of muscular power, great dyspnœa, painful constriction of the chest, and fear of impending death. In cases of melancholia we have found the patients complain of violent agitation of the stomach and bowels, with a disposition to shed tears. We have known the silence of a sick house unexpectedly disturbed by the uncontrollable and loud laughter of a patient dangerously ill of fever. Very decided hysterical symptoms came on during convalescence from fever in a boy who was a patient of the University dispensary: his mother was much troubled with hysterical fits; the boy's affection was evidently caused by debility, and disappeared as he regained strength. Sydenham relates the following case, in which the cause and the result were the same. It deserves to be quoted, both as an illustration of the practice of that great physician, and on account of the important relation of such cases to the theory of the causes of hysteric disorders in general.

"I was called," says he, "not long since to an ingenious gentleman, who had recovered of a fever but a few days before. He employed another physician, who had bled and purged him thrice, and forbid him the use of flesh. When I came, and found him up, and heard him talk sensibly on some subjects, I asked why I was sent for; to which one of his

* *Traité des Maladies Nerveuses*, p. 70.

* Vol. ii. p. 288.

friends replied, if I would have a little patience I should be satisfied. Accordingly, sitting down and entering into discussion with the patient, I immediately perceived that his underlip was thrust outward, and in frequent motion (as it happens to fretful children, who pout before they cry), which was succeeded by the most violent fit of crying I had ever seen, attended with deep and almost convulsive sighs; but it soon went off. I conceived that this disorder proceeded from an irregular motion of the spirits, occasioned in part by the long continuance of the disease, and partly by the evacuations that were required in order to the cure; partly also by emptiness and the abstinence from flesh, which the physician had ordered to be continued for some days after his recovery, to prevent a relapse. I maintained that he was in no danger of a fever, and that his disorder proceeded wholly from emptiness; and therefore ordered him a roast chicken for dinner, and advised him to drink wine moderately at his meals; which being complied with, and he continuing to eat flesh sparingly, his disorder left him."^{*}

This subject is of so much importance, particularly as regards the alleged dependence of all cases of hysteria on some disorder of the uterus, an opinion which cannot be admitted without materially influencing our practice, that we shall quote one or two more examples from authorities which cannot be called in question.

In Dr. Whytt's work on Nervous Disorders, which has already been more than once referred to, and which deserves, even at this day, an attentive and entire perusal, the following case is related, the connection of which with hysteria of the periodical character appears unquestionable.

"A boy of ten years of age, of a very sensible nervous system, who, in December 1747, had been seized with a palpitation of his heart, fell from his horse about the beginning of January. From this time the palpitation left him; but in a few days after he was attacked with a violent headache, returning sometimes once a day, at other times only every third or fourth day. During the fit his pulse became smaller and quicker, and often intermitted; his feet were cold, but, by the violence of the pain, a plentiful sweat broke out and relieved him. As these headaches continued to increase, the patient lost his stomach and flesh, and looked pale. By the use, chiefly, of an electuary of the bark and valerian, in less than three weeks the pain of the head abated greatly; but his appetite grew worse, and he often complained of a nausea. These symptoms, however, were all removed in four or five days, by some warm stomachic and cordial medicines, but were succeeded by an

intolerable pain across the middle of his belly, which, in the space of eight days, returned five or six times, and not only affected his pulse, as the headache had done, but sometimes occasioned a difficulty and pain in making water. This pain no sooner left his belly than the headache returned with greater violence than ever, so that the boy used to faint in some of the worst paroxysms. It had no certain periods, coming sometimes twice a day, sometimes only once in two days, and was attended with a sense of suffocation from wind, and a lump in his throat. He was easiest in the night, when he slept or lay quiet, but any considerable motion of his body always raised his headache. Before the fits he was observed to be uncommonly lively, and disposed to laugh. On the 21st of February, at two in the afternoon, he was seized with fits of involuntary laughter, between which he complained of a strange smell, and of pins pricking his nose: he talked incoherently, stared in an odd manner, and his complexion changed to a livid colour; immediately after he was seized with convulsions, and then fell into a fainting fit, which lasted near half an hour."

The remainder of the case may be abridged. Purulent matter was subsequently discharged from the nostrils and the right ear, with some alteration in the situation of the pain, which shifted to the back of the head, and then to the left side of the abdomen, "between the short ribs and os ilium, confined to a space little larger than the breadth of a shilling. This pain was often so severe as to make him ready to faint; sometimes it shifted, and then he was seized with fatiguing fits of involuntary laughter."

This case appears to have resembled some of those mutable examples of the disease which are more commonly met with in females, and in which the relief given to one affection is but the signal for the raising up of another, constituting cases comprehended in Dr. Marshall Hall's excellent description of "Disorder of the General Health."

The fact of hysterical disorders appearing in male subjects is supported also by the highly respectable testimony of Dr. Ferriar.* "Men," he says, "are frequently attacked by complaints which approach to the hysterical type. In the following instance a young man was affected with regular hysteric fits, in consequence of continued vexation and anxiety. In spring, 1789, I was desired to visit a patient about seventeen years of age, on account of fits with which he had been seized a few days before. I was told that they began with great dejection of spirits, sighing, and uneasiness about the præcordi. He then became apparently insensible, but groaned much, and did not recover for a considerable time. He relapsed frequently, from slight causes, and often had three or four fits in a day. He said that he felt the globus hystericus at the approach of each paroxysm, and he said that he retained his senses, in some degree, to the termination of

* Op. cit. p. 381. Cases of hysteria in men are also mentioned by Louyer Villermay and by Georget: the latter quotes the words of Piso, (or Lepois, an author of the 17th century, whose name is latinized according to the custom of the time,)—*Hysterica symptomata omnia fere viris cum mulieribus communia sunt. Caroli Pisonis Select. Obs. et Consil. &c.* We have no opportunity of referring to the original.

* Medical Histories and Reflections, vol. 1, p. 128.

each. His pulse was weak and hurried; his tongue somewhat foul; and his countenance timid. His evacuations were natural. I do not recollect the particular nature of his employment, but it was of a sedentary kind. After clearing his stomach by an emetic, I directed some pills to be made up composed of opium and assafoetida, and to be given in such a manner that he took half a grain of the former and four grains of the latter every hour previous to the approach of the coming paroxysm. On the first day of taking the pills the fit came on, but in a slighter degree. The next day he was ordered to begin at a greater distance from the usual time of the fit. He took by this means three grains of opium, and more than a scruple of assafoetida. The paroxysm was effectually prevented by this dose, without producing the smallest uneasiness to the patient. Two of the pills were given at bed-time for a few nights afterwards, and the cure was finished by administering tonics."

In the above case the evidence of the *juvantia*, taken together with that of the symptoms, seems to leave no doubt of its being an example of hysteria; and we shall not dwell longer on this point, except to refer to a remarkable instance of temporary loss of voice from hysteria, occurring in a recruit in the East India Company's service, and related by Mr. Watson, the surgeon of the ship on board of which the patient was a passenger.* The subject of this case was a strong healthy man, who complained first of giddiness and headach, was then convulsed, and had some of the symptoms of epilepsy, as distortion of the muscles of the face, and discharge of frothy matter from the mouth. After an interval of some hours these symptoms returned, with alternate laughing and crying, spasms about the throat, and inability to speak, although he was perfectly sensible. After being twice bled, and having a blister applied to his head, and taking some active purgative medicine, he recovered his speech, in about forty-eight hours. The account he then gave of himself was that he was prevented from speaking by a tightness in his throat, which felt as if something was in it. Mr. Watson observes that but for the supervision of those symptoms the case would have been considered as epilepsy. It is worthy of remark that another case occurred on board of the same ship about a fortnight afterward, of which the subject was an artillery-man, who, however, recovered his speech on the following morning. Mr. Watson, in conclusion, quotes Dr. Trotter† as saying, "We found not a few of the cases sent to the hospital-ships subject to very frequent fits of hysteria; and where this singular affection occurred, with as much violence of convulsion as we have ever marked it in female habits, attended with globus, dysphagia, immoderate risibility, weeping, and delirium."

These cases and authorities are, we think,

sufficient to set the question at rest. The cases of hysteria in men must, however, still be considered as rare; although we have met with few observant practitioners who have not answered our inquiries on this point by stating that they had seen one or two examples very much resembling it.

Diagnosis.—The importance of not pronouncing serious diseases to exist which are only simulated is almost equal to that of not overlooking serious disease when it is really established: in the latter case the patient's life may be sacrificed to neglect; in the former it may be destroyed or endangered by unnecessary activity. For these reasons we have already insisted on the propriety of every opportunity being taken to enlarge the practitioner's knowledge of the varieties of hysteria; and it is equally necessary that he should keep in mind the tendency of all the violent forms of this disorder to pass to severer and more permanent lesions of function, and even to lesions of structure. Fortunately, the diagnosis of the most important cases is commonly the easiest; as it is more easy to recognize and verify the symptoms of severe diseases, the existence of which may be apprehended. Cases, however, will now and then present themselves requiring the greatest degree of circumspection, and the circumstances in which the patient is placed are often of a nature to produce agitation and haste, of which the effects are most pernicious. It is only by a careful study of the symptoms of diseases of the brain, lungs, heart, intestines, liver, kidney, and other important organs, and by a scrupulous comparison of *all* their symptoms with the case before him, that the practitioner can escape deception; for many symptoms may be present without real disease, and sometimes serious disease may be present and yet only partially represented by the ordinary symptoms. The slightest admixture of hysterical phenomena forms a sufficient ground of suspicion, and any great departure from the ordinary course and effects of maladies should alone awaken great vigilance. Great mutability of symptoms, or intervals of ease alternating with symptoms of much violence, will generally declare the nature of the case at once. There is, in truth, nothing so difficult to be written, or to be learnt by reading, as diagnosis, in this as in all other instances; but habits of caution, of tranquil observation, and of careful consideration, may be learned by every practitioner of ordinary capacity; and, thus disciplined, he will seldom be deceived, even by hysteria.

To distinguish hysteria from epilepsy, a disease generally so much more formidable, is of such great importance that almost all who have treated of these diseases have attempted to lay down certain marks of difference between them. Yet M. Louyer Villermay informs us that M. Pinel, on instituting an examination of the patients detained in the Salpêtrière as epileptic, found a great number of women, several of them young women, who were only hysterical, and yet who were separated from

* Edin. Med. and Surg. Journal, vol. xi. p. 303.

† Medicina Nautica, vol. ii.

their families and from society.* To pronounce a young female patient epileptic is often in its consequences only second to pronouncing her insane: the disease is considered to be incurable, to have a tendency to destroy the understanding, and to be transmissible to offspring; none of which terrible evils are associated with the name of hysteria.

The attack of hysteria is commonly less sudden and less violent than an attack of epilepsy. Epilepsy is often ushered in by a loud cry; the patient falls violently to the ground; the muscles of the face are severely convulsed; the eyes are distorted; the tongue is protruded and bitten, and frothy saliva forced out of the mouth. In hysteria there is seldom any incipient cry, although the patient may cry or laugh during the paroxysm; the patient, except in the comatose variety, does not fall suddenly, but, feeling the approach of the fit, is usually attacked after sitting or lying down: the muscles of the face, and the eyes, are usually tranquil, and the face is generally flushed, whereas in epilepsy it has often a ghastly paleness. The hysteric patient does not protrude or bite the tongue, nor is there a discharge of frothy saliva. The epileptic patient does not laugh or shed tears, but is in a state of fixed and intense agony; neither is globus a sensation known to him. After the fit the epileptic patient generally falls into a heavy sleep or sopor. During the paroxysm of hysteria the pupils of the eyes are commonly sensible to light, which is not the case in epilepsy. After the paroxysm the hysteric patient often remembers all that has passed, which the epileptic does not. It may be added that epilepsy is most common in men, in whom hysteria is rare; and that the character, habit of body, and history of the cases, will frequently afford instructive circumstances of difference.

It was Sydenham's custom, he tells us, always to enquire whether any particular disorder about which he was consulted in women did not chiefly attack them "after fretting, or any disturbance of mind;" and, in an attempt to make a difficult distinction, such an inquiry, and others of a similar tendency, will sometimes not be found superfluous.

"The patients and the nurses at the Salpêtrière," says M. Georget, "attach the principal importance to the three following characters of epilepsy: the want of precursory symptoms; the complete loss of consciousness; and the distortion of the mouth and state of the eyes. They say of a case of hysteria passing into epilepsy, that the patient begins 'to laugh on one side' and 'to turn her eye,'—*à rire de côté, et à tourner l'œil.*" The cases here pointed to, cases of mixed epilepsy and hysteria, are certainly now and then met with; and their character is of course only to be determined by the assemblage of symptoms in each.

The remarkable impression left on the countenance by successive attacks of epilepsy is familiar to all medical observers: there are few

instances in which the face presents no trace of the storms which have passed over it and over the whole frame. The same protruding eye and dulness and passiveness of look are not seen in the hysterical; and when the hysteric character is at all imprinted in the physiognomy, it is rather to be read in a changeful expression, and unquietness and want of repose in the face, which it is not easy to describe.

Causes.—A mere inspection of the various forms of hysteria would, one would suppose, be of itself sufficient to shew that all were not very likely to arise from one kind of cause; but that, if all the causes are admitted to act on the brain, and through the nervous centre on the parts affected in the paroxysm, still the seat of the primary irritation is various. But, perhaps from the disposition in the human mind to avoid a complication of difficulties, many authorities have ascribed all the varieties and examples of hysteria to some one irritation, as, for instance, to irritation of the uterus. A comparison with one another of the examples of this disorder which have fallen under our own observation leads us to reject all such exclusive views of their origin, and to believe that the causes of hysteria may consist of any circumstances capable of producing a particular excitement of the nervous system, or certain portions of it, which excitement leads to all the other phenomena. Of the primary irritation we should say that by far the most common seat is the uterus and the intestinal canal; but that sometimes the irritation is such as primarily to affect the whole nervous system, as plethora, anæmia, atmospheric changes, and mental impressions. Such being the exciting causes, of the predisposing cause we can only say that it is a peculiar and constitutional susceptibility to impressions, with an inherent disposition to institute certain actions affecting particular organs and functions, the object of which actions seems to be the relief of the nervous system, sometimes by the equalization of the circulation. We are not more able to explain the form of these actions, or the hysterical paroxysm which supervenes on the cerebral excitement springing from the primary irritation, than we are to explain the ordinary phenomena of laughing or crying, arising from a similar cerebral excitement originating in impressions primarily affecting the mind.

That certain states of the uterus, causing peculiar sympathies in different parts of the frame, are the causes of hysteria, is an opinion of great antiquity, and has been supported by nearly every observer from the time of Hippocrates, who has often been quoted as saying that a woman's best remedy in this disorder is to marry and bear children. Whoever considers the sympathies excited by the changes which the uterine system undergoes at puberty and during pregnancy, and at the cessation of the catamenia; the altered form and character of the young female; the capricious wishes and taste, or *longings* of the state of utero-gestation; and the morbid actions of what is called the "change of life;" will without difficulty

* *Traité des Maladies Nerveuses*, vol. i. p. 117.

admit that the hysterical phenomena, bodily and mental, may very probably be called forth by peculiar conditions of the same dominating system in the female economy. Extensive experience confirms such an opinion; and the occurrence of hysteria in early life, or after marriage, or at a later period, is so often observed in individuals in whom there are evident signs of the activity of the uterine system, as to connect the two circumstances together in the firmest manner. Precocious development and disappointed hopes on the one hand, and excessive indulgence, or marriages immature or physically disproportionate on the other, are causes of hysteria of which every practitioner finds illustrations within the circle of his own practice; as well as of the disappearance of hysteria after a long-desired marriage, or when means are taken to prevent hurtful excesses. In some females hysteria supervenes on puberty, continues to be more or less troublesome until the period of cessation, and then disappears. In others, as was remarked by Hippocrates, it disappears during pregnancy. And in the few cases in which death has seemed to supervene on simple hysteria, disease, as has already been mentioned, has been discovered in the uterine appendages. We cannot therefore be surprised to find that many ancient and modern writers have considered hysteria as being solely a manifestation of a disordered uterus; and that various theoretical notions have been engrafted, in the different periods of physic, upon this too exclusive opinion; some of which have been disproved by the progress of anatomy and physiology, such as the dependence of hysteria on the ascent of vapours from the womb, and of the symptom of globus on the ascent of the womb itself. To such notions we now only allude as curious remains of an age delighting in medical conjectures, and unpossessed of means of obtaining more accurate knowledge. But the facts on which such theories and practices conformable to them were built, yet remain; for nature and the laws of the human body are yet the same. In a susceptible female temperament, and in the unmarried state, the system of reproduction, every change in which involves many other changes, acts strongly on the system at large, and in certain circumstances disorders all the functions of the body and the mind; the digestion of food, the circulation of the blood, the judgment, the affections, and the temper; and in many of these cases all the mischief is removed by marriage, which, by awakening the natural functions and normal sympathies, allays the whole series of irritations or morbid actions. There can, therefore, be no reasonable doubt entertained that in a great many cases—perhaps we might say in the majority of cases—the cause of hysteria is some more or less discoverable irritation existing in some part of the uterine system, exercising its wide influence on the susceptibilities of a nervous system by nature too easily affected by all impressions. We may perhaps agree with M. Louyer Villermay to call this “a nervous disturbance, an exaltation of organic sensibility of this organ;” but

we must add that his statement of the proofs of such a condition, drawn from the asserted state of the hypogastric region, of the vagina, &c. &c.* however consonant with the older doctrines, has an air of inefficient practical observation which would almost lead us to doubt, with M. Georget, whether or not he had actually ever seen a case of hysteria. The very abuses to which such a theory has led and must lead, and the unjust suspicions to which it would often give origin, are sufficient to draw even a minute attention to its foundation.†

As far as the writer's experience has extended, and from observations made whilst recording very numerous cases, comprehending nearly all the forms of amenorrhœa, hysteria very rarely supervenes on the amenorrhœa of *young women*; and, compared with its frequency *after* the age of twenty, very seldom appears *before* that time. In cases, also, in which the hysteria has most plainly depended on the suppression of the catamenia, the comatose form of the paroxysm has appeared to be the most common. We have frequently found hysteria co-existent with chronic leucorrhœa and repeated attacks of menorrhagia, in circumstances clearly indicative of what might be termed an irritable uterus; in individuals liable to frequent miscarriages, and in whom the stomach and bowels suffered much sympathetic disturbance. In these cases there is, we believe, generally a disposition to change of uterine structure; inasmuch that we should say that a patient who has obstinate hysterical symptoms, and now and then a paroxysm, in early life, or between twenty and thirty years of age, has, in a majority of instances, a predisposition to serious uterine disease, requiring great attention. As such patients advance in life, it will be found that the symptoms become more troublesome, and the sympathies of the whole constitution stronger; whilst in many of the cases there takes place a congestion in the vessels of the uterus, or a sub-inflammation, or indolent tumours are formed, or polypi are thrown out from the interior of the uterus, or the uterus descends lower than its natural position, or malignant disease makes its appearance. We should observe, although it seems to contradict the little that is recorded of the morbid anatomy of the disease, that in the most confirmed and striking examples of ovarian disease which we have met with, there have never been any hysterical symptoms, even of the slightest kind.

These observations, which are the simple result of some attention paid to this subject

* Dict. des Sciences Méd. art. *Hystérie*.

† For an illustration of this the reader is referred to the case of a nun in Sauvages' Nosol. Method. tom. iii. We cannot venture to quote the treatment, although recorded in a learned language. The substance of the ancient uterine theory and some of the singular methods of cure which originated in it may be read in Sennertus, tom. iii. lib. iv. pars ii. sect. 3, cap. 4. *De suffocatione uteri*; and a refutation of much of the theory may yet be referred to, with advantage, in the writings of Willis, De Morb. Convuls. and Van Swieten. Willis notices the occasional occurrence of hysteria before puberty, of which we have seen one remarkable example.

during several years, added to the fact that hysteria sometimes occurs before puberty, and sometimes after the cessation of the catamenia,* whilst they confirm the opinion of the frequent connexion of hysteria with uterine disorder, lead us to regard it as having much less connexion with the catamenial function than has been maintained, with a positiveness greater than we think extensive experience would warrant, by some of the most recent writers on hysteria. The question is of great practical importance; but we must now leave the consideration of it to the reader.

We are ourselves convinced, then, that the uterus is not the only organ of which the irritations may so affect the nervous system as to produce hysteria; and this not only from the above considerations, although supported by additional cases in which the uterine functions have continued to be perfectly performed,† but because there is in many instances of hysteria such evident disorder of other functions, and so manifestly, as it has appeared to us, leading to every form of nervous irritation of the hysteric kind up to the paroxysm itself. We might, indeed, adduce the occurrence of hysteria in *men* as at once decisive of the question, but we do not think it absolutely necessary to the argument; although, if such cases are admitted, they must inevitably be taken as putting an end to it.

Among the most frequent causes of hysteria next to uterine irritation, must be placed gastro-intestinal irritation; whether from excess, or from improper food, or from depraved or deficient secretions, or from diminished peristaltic action, and the delay in the intestines of the natural excretions. The extent to which the proper evacuation of the bowels is neglected in female patients is almost incredible, and is so often the sole cause of the ailment under consideration and of many others, that we cannot wonder at the general acceptance of the aloetic or purgative treatment of their disorders. The presence of worms has sometimes excited hysteria;‡ perhaps it may often be an unsuspected cause: we have seen the most violent and repeated attacks of epilepsy, which had recurred for many months, cease after the passing of one large round worm. All the causes of indigestion may become causes of hysteria to those whose constitution of nervous system is predisposed to be acted upon in the specific mode, whatever it be, in which it is affected when the hysteric phenomena are produced. In many cases of hysteria there seems to be a peculiar sensibility of the gastro-intestinal mucous membrane, giving rise to irritability of the stomach and bowels, and thus disordering the

nervous system; and such a state may sometimes be the exciting cause of hysteria, sometimes by its influence only predispose the nervous system to the specific irritation of hysteria on the supervention of any of the other causes. The effect of improper diet, either as regards food or drink, in increasing the nervous susceptibility to all impressions, is probably produced by the intervention of this gastro-intestinal exaltation of sensibility, of which indeed, in such cases, there are many proofs. It seems to be in this manner that luxurious livers and excessive drinkers are always at length punished by an uneasy digestion, and by all the pains of what is commonly called *nervousness*; which last, increasing by degrees, sometimes converts a brave man into a coward, and invariably disqualifies men more and more for great and original undertakings, and even for sustaining the ordinary reverses and agitations incidental to social life. When it is considered that the nervous expansion over the intestinal tunics has been described as analogous to the expansion of nerve constituting the retina, we can readily believe that much disorder may be effected by irritations of this nervous expansion without necessarily ascribing them to circumscribed attacks of enteritis, as M. Broussais has done. In many cases, in which no positive signs of such inflammations exist, the irritations cease or are greatly mitigated on the appearance of fæces indicative of depraved secretions; cases described by the older physicians as abounding in *phlegm*. The motions in such cases are dark or olive-coloured, sometimes passed with much pain, although not hard, and seldom procured without medicine. The excessive flatus which is the torment of certain hysterical patients is in all probability connected with some morbid condition of the intestinal nerves; may in fact be looked upon as an excess of a natural product in the intestines, the result of deranged actions. Partly from the stimulus of so much air, and partly from the morbid condition of the intestines, which produces it, the muscular fibres of the intestines are thrown into commotion, or at least excited to vehement action, creating a feeling of movement and a rumbling noise which becomes a source of annoyance to the patient. Upon this disordered state spasm frequently supervenes, and it would seem generally to commence in the lower part of the intestines, near the termination of the colon in the rectum, and to ascend, producing the feeling of globus already described.*

* Other irritations of the intestines seem also to commence in the lower portion, and to proceed upwards. Diarrhœa commonly precedes vomiting in the cholera. Herniæ excite irritation *above* the protruded portion of bowel or omentum. The symptom of globus has been noticed in some instances of severe gastritis, and is in such cases supposed to depend on spasm of the cardia extending to the œsophagus. Broussais considers it as indicating inflammation of the whole stomach; but what bears somewhat on the present subject is that in these instances the capacity of the organ has been found greatly contracted, reduced to the capacity of the small intestine. See GASTRITIS.

* Willis, op. cit. See also Dr. Bright's Cases, vol. ii. case ccxx. This was a case of nymphomania after cessation, accompanying uterine disease. M. Georget would consider it a case of cerebral disorder.

† For a case of this kind, in which there was hysteria with temporary paralysis and no uterine irregularity, see Parry's Posthumous Works, vol. i. p. 370.

‡ The hysteria *verminosa*. Sauvages, Nosol. Method. tom. iii.

It happens, however, not uncommonly, that even when the state of the uterus is the real cause of the hysteric disorder, the suppression or insufficiency of its accustomed secretions is followed by such derangement of the digestive organs, that the hysteric phenomena appear wholly to depend upon the latter; a fact which did not escape the observation of Whytt, who remarks that "when the menses are obstructed, the stomach generally suffers first, and by means of its *consent* with almost every part of the body, gives rise to many of the complaints which follow. Thus the hysteric convulsions and other violent symptoms which are sometimes occasioned by a sudden stoppage of the menses, do not seem to proceed immediately from the uterus, but commonly from the stomach and bowels, whose nerves are first affected either by their sympathy with those of the womb, or by the blood which should have been discharged by this organ being partly turned upon the alimentary canal."* But, on the other hand, it is equally certain that attention to the order of the phenomena in hysteria will often detect the priority of the intestinal disorder, which the uterine irregularity seems, in such cases, to follow as a consequence. Such are the complications met with in practice; baffling to those who trust wholly to their books, and only to be prepared for by a careful clinical education; a kind of education not confined to the schools, but within the reach of every practitioner who has access to numerous examples of disease.

Either the uterine disorder or the intestinal disorder, which are thus seen to have the power of producing each other, may produce the nervous irritation, or the congestion, or whatever morbid condition it may be, of the nervous system, or of certain portions of it, which induces the hysteric paroxysm. Either of them, also, may thus act as a cause predisposing to the hysteric paroxysm, or as a cause exciting it without the supervention of any other known cause.

Another cause of hysteria, also, sometimes predisposing to, sometimes exciting the paroxysm; sometimes connected with uterine disorder, sometimes leading to it; is a plethoric condition of the body, or of the nervous system, or apparently of portions of that system. The appearance of the patient commonly indicates the presence of this cause in patients who are indolent and overfed; but as it is often combined with an oppressive feeling of debility, with a pale or bloated complexion, and a languid pulse, and as the plethora may exist with reference to the strength of the patient only, it sometimes escapes attention.

Both hysterical and epileptic attacks are occasionally attended with hemoptysis. We think, also, that it is too common to set down cases of periodical vomiting of dark-coloured or sanguineous fluid as dependent on uterine disorder, when, although the menstrual discharge may be rather less than natural, really dependent on plethora. Patients of the de-

scription here meant complain of pain of the stomach, distention, flatus, and coldness of some portion of the abdomen, followed by the vomiting. The pain and other symptoms alternate with severe pain at the upper part of the head, accompanied with several symptoms which may be called nervous, such as a sense of coldness in the eyes, nose, and face generally; and they are subject not only to great agitation of spirits on slight occasions, but to severer symptoms, such as temporary insensibility, seemingly connected with fulness of the cerebral vessels. They also often complain of pains and swellings of the hands and arms, and feet and legs; they are soon and much disordered by errors of diet; inclined to be fat; subject to profuse perspirations on making slight exertions; and their bowels are constipated, as well as the catamenia deficient. In such cases the plethoric condition finds no natural or no effectual relief; and bleeding and medicine must be the substitutes for the dietetic restraint and proper regimen which often cannot be enforced, as well as for the vomiting which has already established itself.

All convulsive affections seem to be capable of being produced both by plethora and the opposite state of debility, or deficiency of nourishment. This may arise from defective powers of digestion and assimilation, or be a consequence of previous disease of some continuance, as leucorrhœa and menorrhagia; or of a recent confinement;* or of protracted nursing; or arise from various other causes which it is unnecessary to enumerate, including any which may lead to a depravation of the blood as well as to deficiency of its actual or relative quantity. It may be worth while to mention that repeated bleedings and excessive purging may have the same effect.†

Some of the older writers laid considerable stress on the influence of a gouty constitution in predisposing to hysteria. Facts of this kind are not easily verified; and hysteria may occur in a gouty family without being really connected with a gouty constitution. There can be no difficulty, in an age when a new and more enlightened pathology of the fluids seems to be dawning, in admitting so much of the ancient humoral pathology as to allow that either a gouty or any other morbid matter in the blood may be the occasional exciting cause of those nervous irritations which characterize a susceptible temperament, just as, in other cases, the same morbid matter, by irritating the nerves of the extremities, appears to excite the common pains of gout and rheumatism. The nervous irritation in these latter examples is sufficiently well established; the existence of a morbid matter yet remains to be proved.

Climate, seasons of the year, occupations, and sex, have generally been enumerated among the causes creative of a predisposition to what has been termed *mobility*, and what we

* Whytt, opus cit. p. 186, who also refers to a case in the Phil. Trans. No. 174.

† Sauvages. Nosol. Method. "a repetitis phlebotomiis et catharticis."

* Opus cit. p. 177.

have spoken of as increased susceptibility of the nervous system. The situation of a country, its soil, its climate, and even its government, determine the occupations of the mass of its inhabitants, and by giving greater or less excitement to their faculties, naturally cause more or less activity and enterprise. The susceptibility which predisposes to various nervous disorders is thus undoubtedly increased or lessened. All the disorders of the mind are said to be less common in Spain and in Turkey than in England. But, as regards hysterical disorders, it is seldom that we have any reason to refer their origin to causes of such general operation; except it be to climate and to seasons of the year. Joseph Frank says that his own observation has taught him that spasmodic affections of all kinds are more frequent in Italy than in any other countries.* Yet the women of Lapland have been described, although we cannot quote our authority for it, as being so susceptible to impressions as to faint on any sudden noise occurring near them. We have ourselves often remarked the increased discomfort of hysterical subjects in warm and showery weather; and especially, without such decided reference to increased temperature, their aversion to the supposed disturbing influence of a cloudy sky: they sometimes say that they "can feel the clouds."

Dr. Mead enumerates hysterical disorders among those which are influenced by the moon; returning when there is a new or full moon; and he refers to a case related by Dr. Pitcairne, and to two recorded by Piso,† one of which was that of "a lady of quality, whose left cheek and part of the neck were wont to swell very sensibly about the new moon."‡ We have already spoken of the modern disregard of all notions of this kind, (see the article DISEASE, vol. i. p. 620,) and shall say nothing more on this occasion than that, true or false, fanciful or real, we have hardly ever known a patient affected with a nervous disorder whose attendants did not stoutly assert these much derided influences.

The influence of sex and of education is more generally admitted, and indeed much more palpably and generally evinced. Medical philosophers declaim, and will long declaim in vain, against a system of education which, apparently solely directed to securing an advantageous establishment to young females, leaves them at once artificial and ignorant; full of the terms of many kinds of knowledge, but wearied or disgusted with all; trained to subdue the feelings only so far as to form alliances from selfish motives, but unprepared to be the companions of intellectual men, or to bear the

neglect which their insipidity, or motives as selfish as their own, too often entail upon them. The predominance of the uterine system, although much less marked in the generality of cases in this country than in those in which the observations of some of the continental writers have been made, is yet sometimes sufficiently declared; and the disappointments of females who begin to feel that they are no longer young, and yet who have not become wives, have in many cases effects sufficiently observable. English practitioners pay, perhaps, too little attention to these circumstances; and, exercising their profession in a country where the passions and emotions have but a limited external manifestation, and where the female character is less intensely expressed, sometimes seem to forget their silent operation on the frame, and are inclined to charge the medical writers of other countries with being somewhat fanciful and extravagant.

"The social position of women," observes M. Georget,* "renders the sex, already subjected to peculiar ills from their organisation, the victims of the most acute and painful moral affections. Their moral existence is entirely opposed to their faculties; they possess a will, and are constantly oppressed by the yoke of prejudices and social arrangements in their infancy and early life; of a husband in their youth; and of indifference in old age. Sensible and loving, they must only love when the master orders them: they are for ever constrained to concentrate within themselves the most powerful passions and the gentlest inclinations; to dissemble their desires; to feign a calmness and indifference when an inward fire devours them, and their whole organization is in tumult; and to sacrifice to a sense of duty, or rather for the happiness of others, the happiness and tranquillity of a whole life." "The education of young women, of which the tendency ought to be to repress the affective faculties, already too prominent, has, as now conducted, opposite effects. A mother would be in despair if her daughter did not give early indications of *acute sensibility*, and nothing is neglected that may endow her with this fatal present: inaction of the muscular system; the cultivation of music; frequent parties, balls, and public entertainments; the understanding unemployed; or books perused which do but excite certain feelings, and nourish illusions contrary to the actual state of society;—such are often the different influences to which girls are subjected at an age when the powers of the mind should have quite a contrary direction. The end answers to the means; one order of faculties alone is exercised; and this will become predominant over the reasoning faculties, and the cause of a host of vaporous, hysterical, hypochondriacal, and maniacal disorders."

Making due allowance for the different character and habits of the two countries, we cannot doubt the justness of these censures. And even in England, where an acute sensibility is

* Quamvis spasmi nec in regionibus septentrionalibus desiderantur, eos tamen longe frequentius in Italia obvenire, mea docent observationses. Prax. Med. Univ. Præc.

† De morbis a serosa colluvie. Piso attributed hysteria to a serous colluvies at the origin of the nerves.

‡ Mead, On the influence of the Sun and Moon upon Human Bodies, and the Diseases thereby produced.

* Op. cit. vol. i. p. 193.

less desired for young women than accurate powers of *calculation*, the improper expectations, the vain rivalries, the restless and frivolous pleasures of fashionable life, are but too well calculated to produce all varieties of nervous disorders in young persons whom an affected refinement has debarred from active and natural exercises, and whose minds have never been accustomed to the exercise of self-control.* In the middle classes different causes are in operation; and women of that class are at present subject to mortifications arising from the inferiority of their husbands in attainments and in cultivated sensibility to themselves. The gentle passions and the romantic feelings, utterly banished from the cold atmosphere of the higher ranks, have yet some sway in a class below them, and there produce occasionally their peculiar effects on the female frame.

But there are causes of disquietude which pervade every rank; for if the utmost attention to fashion could wholly still the voice of the natural feelings, it cannot suspend the inevitable flight of years and advance of old age; a phantom uninviting in its aspect to all, but to the fair, the frivolous, and the vain, a spectre of the utmost horror. On this subject M. Georget has expressed himself in language too applicable to every nation. "Man, as he advances in age, increases in power, in fortune, in dignities, in consideration. It is quite otherwise with woman: the progressive steps of life, when youth has once passed away, are for her an actual descent in the social ranks, and the sources of painful moral affections. There are few who can see without regret their attractions fading, and the flight of smiles and love, and the loss of the empire of beauty: these losses are felt the more keenly, because it is from others that the first knowledge of them is derived; for self-love makes many struggles, and the unwelcome persuasion is only established after many mortifications." "If devotion does not effect a salutary diversion in the ideas, or if a truly philosophical resolution does not early impart to woman the courage and firmness necessary for clearing this terrible abyss, the critical age becomes a stormy period, abounding in vapours, mental disorders, hysterical and hypochondriacal affections, often ascribed, without consideration of their origin, solely to that period of life, or to the cessation of the catamenia."

The causes acting through the mind which have now been mentioned, are occasionally exciting causes, but much more frequently only predisposing. Mental impressions of a more sudden and transient character may act as causes immediately exciting a paroxysm; such as anger, grief, terror, or great surprise. It is unnecessary to accumulate illustrations of the powerful effect of these impressions; the slightest operation of them in their lower degrees

is familiar to the commonest observation. But from this slight operation, involving mere disorder in the vascular and nervous systems, indicated by blushing or paleness, by palpitation, by increased excretions, by hesitating speech, may be observed gradations to the more severe results of slowly formed disease of structure, as in the heart; or of changes more rapidly produced, though less important, as in the colour of the hair. More commonly, however, the severer results are produced by causes long operating on the mind: whilst the more sudden impressions, when their violence is greater than ordinary, produce a simple loss of power in the nervous and muscular systems; the state of syncope, from which there is a gradual recovery by a moderate reaction: but this loss of power may be greatly protracted, no reaction may take place, and death may ensue; or overwhelming reaction may be produced, and fatal apoplexy. Generally, however, the severer shocks lead to a reaction, which is violent without being fatal; and after the feeling of faintness or depression, or sometimes almost without time being afforded for that feeling, the muscles are thrown into disordered and energetic motions, and all the vascular and nervous actions become irregular or tumultuous, and assume the form of hysteria or of epilepsy. Even the mimic representation of the more agitating passions will sometimes produce these effects; and hysteria has converted the cries and screams of the actress into reality, whilst the female part of the spectators have been similarly affected. Dr. Gregory used to relate, that when Mrs. Siddons first appeared in Edinburgh, these effects upon the audience were so common, that it became quite the fashion for the young men of the place to attend the theatre to carry off those affected; a service which was termed "carrying off the dead."

We cannot help again, in this place, endeavouring to impress upon the reader that sometimes the reaction after these sudden impressions takes the form of acute delirium. There is no inflammation of the brain or its membranes, no discoverable change to be detected after death, when death occurs; and the best treatment is *not* the active treatment sometimes resorted to, but the treatment proper for hysteria. Above all things, the practitioner must avoid sending such cases to a madhouse. Whenever such attacks are found to have suddenly supervened on an acute moral impression; after violent disappointments of the affections; vehement invasions of jealousy; or even after marriage, when there is reason to suspect the existence of peculiar physical circumstances which can here only be alluded to, the practitioner cannot be too little precipitate in his measures. One or two remarkable cases of the latter kind have come to our knowledge, where the result was fatal; and we think their real nature has not been sufficiently reflected upon.

Another mental influence productive of hysteria requires to be mentioned, because it suggests certain precautions in the management of such cases; namely, the influence of imita-

* The reader may be advantageously referred to Dr. Parry's admirable remarks on the Effects of Habits in creating Predisposition to Disease. *Elem. of Pathol. and Therap.* vol. ii. See also the article PHYSICAL EDUCATION.

tion. One hysterical patient in the ward of an hospital will sometimes produce many more. Of this an instance has already been mentioned on the authority of Dr. Bright; and these effects have been so often noticed, that, generally speaking, no place can be less suitable to patients affected with hysteria than an hospital. Even in private practice such communications of disease occasionally take place. Dr. Gregory used to mention an amusing instance of a lady's maid thus involuntarily imitating her mistress; and M. Loyer Villermay mentions similar accidents in the article *Hystérie*, in the *Dictionnaire des Sciences Médicales*. Dr. Darwin speaks of the inmates of a nunnery who were all afflicted, one after the other, and at length altogether, with a desire to imitate the inharmonious nocturnal sounds of cats. Dr. Whytt alludes to a disease common in the island of Zetland, and almost exclusively affecting young unmarried women; sometimes, however, appearing in the male sex; in which there was first violent palpitation, and then the patients fell to the ground; their arms and legs being either convulsed or rigidly extended, and their respiration difficult. The great inconvenience of this affection was, that when any one was attacked with it, at church, in the market, or in a public place, straightway all who had ever been subject to it were attacked again; whilst others, in the great disturbance thus occasioned, became for the first time similarly affected. All these examples merely illustrate the proneness to imitation which is observable in all persons in early life, and which continues longest to adhere to the character of nervous and very susceptible persons, and, consequently, to many women. This is particularly seen in schools, which have sometimes furnished remarkable cases of squinting, stammering, and awkward motions, solely occasioned by imitation.

The celebrated Boerhaave, his nephew Kaau Boerhaave informs us, was consulted concerning the occurrence of a more serious affection which was introduced into the house of charity at Haerlem. A girl having become subject to paroxysms of a convulsive disorder, in consequence of fright, one of the bystanders on the occasion of one of her attacks had become affected in the same way, and then a third, and afterwards a fourth; and subsequently almost all the boys and girls in the institution. Like the people of Zetland, too, as soon as one fell into a fit, all the rest followed. The malady was considered to be epileptic, and all the usual means of relief were tried without the least effect. Boerhaave, therefore, determined on trying what could be done by a powerful mental impression; and, with the concurrence of the magistrates, caused several portable furnaces to be introduced into the house, containing burning coals; and in these furnaces were placed irons bent to a peculiar form, for the purpose of being made red hot. Assuming great gravity and dignity of manner, he declared, in the hearing of all the boys and girls, that other means being useless, it was requisite that whoever became attacked with

the fits should immediately be burnt in the arm with one of the bent irons, and to the very bone. It is added that the children, terrified by the idea of this remedy, were enabled to resist all tendency to a recurrence of the troublesome disorder which had affected so many of them.

Dr. Haygarth was consulted, in 1796, respecting a convulsive malady which prevailed in the island of Anglesey, and chiefly affected females. The symptoms were, a pain in the head or side, succeeded by violent twitchings or convulsions, during which the shoulders were nearly brought together. This disorder excited great alarm, and in the course of two or three months eighteen girls had become affected by it. Other instances are related in a pamphlet of Dr. Haygarth's;* and we shall not dwell longer on this part of the subject.

Before concluding our notice of the causes, we would observe, with respect to the cases of *hysteric asthma*, that, when the frequent connection between indigestion and asthma is considered, it will easily be supposed that the exciting cause of this particular form is often a disordered state of the stomach and bowels. But this complication is by no means invariable in hysteria; in which the asthma is often dependent on simple nervous irritation, produced by various causes; a fact which may be readily admitted when we recollect some of the nervous symptoms even of common asthma; the irritability preceding the attack, the urina profusa, the periodicity of the paroxysms. The nervous irritation may be of various origin: sometimes, doubtless, in the intestinal canal; often in the uterine system, particularly in the hysterical; and sometimes in impressions on the mind; the irritation being transmitted along the respiratory nerves with a facility which we only attempt to explain by referring to other instances of their prompt sympathies equally inexplicable.

The same observation may be extended to hysteric palpitation of the heart. No symptom more frequently arises from a disordered stomach than palpitation, and such may be its origin in some cases of hysteria. But the same system is a most familiar consequence of mental impressions, and of various other irritations; in all of which cases it is referred to the law of nervous sympathy. Few impressions capable of inducing nervous phenomena fail to produce palpitation; and sometimes it may be found that the paroxysm *consists* of palpitation; which perhaps takes a periodical form, with just so much of other hysterical symptoms as to create a suspicion of its real nature.

The headach, also, so commonly afflicting the hysterical, is known to be the commonest of all attendants on indigestion: it is also particularly common in females at the monthly periods. But it will undoubtedly often be found to occur in the hysterical as a direct con-

* On the Imagination as a Cause and as a Cure of Disorders of the Body; exemplified by Fictitious Tractors and Epidemical Convulsions. 1800. See also Rees's Cyclopædia, article *Imitation*.

sequence of nervous irritation; neither yielding to the remedies of indigestion, nor affected by the periodical functions of the uterus, nor relieved by repeated detractions of blood; indeed, sometimes much aggravated by the latter; but greatly mitigated, and sometimes banished very speedily and entirely, by what are called nervous medicines. We dwell on these apparent minutiae because they are really of importance in practice; and because great attention to the real causes of the hysterical phenomena will often save much time and spare the patient from the infliction of much unnecessary medicine.

There are circumstances connected with the hysterical headach, well known to all observers, but not easy to be explained. One is, the very common limitation of the pain to a small space above the eye. Sydenham was content to ascribe it to an "irregular motion of the spirits, in which all the spirits are collected in a certain point of the pericranium." It is easier to see the futility of this explanation than to furnish a better. Sydenham seems to have been much pleased with the solution, for he adds,— "and this contraction of all the spirits into a kind of point, differs little from the collection of the rays of the sun by a burning glass; for as these burn by their united force, so those for the same reason cause a pain, by tearing the membranes with united violence."* The difficulty of giving a proper explanation of this peculiar pain is, however, not greater than that of accounting for the pain under the left breast in the tedious cases already described; and the pathologist is sometimes able to do no more than thus to escape one difficulty by pointing out another which is analogous to it. The intermissions and returns of the pain belong, in like manner, to many affections dependent on morbid conditions of the nervous system; and although, like them, sometimes occasioned by obvious recurring causes, are also sometimes as little understood as the paroxysms and intervals of neuralgia, of epilepsy, or of insanity.

Pathology of hysteria.—Nearly all that can be properly said to have been ascertained respecting the pathology of hysteria has been incidentally spoken of in the foregoing description of the varieties of the disorder and of their various causes. The malady chiefly affects women, or men of a peculiar temperament, or whose constitutions have become enfeebled by intemperance, or by excessive study, or other causes capable of debilitating the nervous system, and of rendering its power of enduring impressions less than in the natural state. A nervous system thus susceptible by original constitution, or thus enfeebled, feels impressions more keenly, and responds to them more forcibly than is seen in firmer organizations, or in a state of perfect health, and, thus prepared, may be excited to disordered actions by numerous accidental causes. In the female system the exciting cause is very often an irritable or morbid condition of the uterine system. But, as this

state of the uterine system appears to transmit an irritation from the uterine nerves to the nervous centre, which irritation is reflected from the centre to the nerves of other parts of the system; so similar irritations appear to arise, in other instances, from other extremities of the nervous system, and especially from the intestinal. In other cases, again, the nervous centres are more immediately irritated or disturbed. The reflected irritation, or that transmitted from the nervous centres, seems most readily to be conveyed to the nerves which preside over the motions of the intestines, and of the heart, and to those of respiration; parts and functions almost always the first seat of the hysterical phenomena. But the irritation may be more diffused; may affect the organs of locomotion and of sensation; and, partly from the specific irritation of the disorder, partly from the manner in which the circulation is affected, (for it is difficult in such a general disturbance to assign a specific cause to each separate phenomenon,) there is a complete loss of the power of moving, and a loss of sensibility and consciousness. It is very probable that the primary irritation of the nerves is soon attended with some alteration in the manner in which the circulation of blood is carried on in them; and the nervous centres may be similarly acted upon. As the disease is seldom fatal, the appearances which have been found after death have for the most part been the mere effects of long-continued disorder of organs from whence the primary irritations have arisen, as of the uterus and its appendages; but in other cases, in which death has supervened in the form of apoplexy upon the hysterical paroxysm, the disordered circulation in portions of the nervous system has been sufficiently manifest in the apoplectic appearances. A state of fulness, of congestion, or of sub-inflammation, in portions of the spinal marrow, may probably often exist. There is, however, every reason to believe that conditions of the nervous system, inconsistent with the proper performance of its functions, often exist without any palpable change in the quantity of blood circulating in the portions of it which are morbidly affected; and that in such cases the functional disorder may leave no visible trace of any kind. On the other hand, sudden and violent changes in the state of the circulation very commonly affect the functions of some part of the nervous system; and even gradual changes in the mere quantity of the blood induce or predispose to all the irritations of hysteria.

If we endeavour to be more precise as regards the exact nature and place of the nervous lesion, we can only be assisted by recollecting the symptoms of an irritated, injected, inflamed, or disorganized brain; and also that the spinal chord may be in like manner affected in any part of its length. It has been observed by pathologists, that when the upper portion of the chord is affected by disease, trismus, impairment of articulation and deglutition, and oppression of the breathing, are pro-

* Op. cit. p. 379.

duced; and that even palsy and death from asphyxia may ensue. When the cervical position has been diseased, tetanic rigidity or convulsions of the muscles of the neck, or palsy of the muscles of the trunk, and paralytic weakness of the diaphragm have been noticed; and results little different have been found in examples of lesion of the dorsal portion.* In cases in which the lumbar portion of the chord is diseased, the lower extremities are almost always paralysed; and first, there is retention, and eventually incontinence of urine and of the faces. These facts, which may, perhaps, be considered as established, point in some degree towards the probable locality, though not very decidedly to the nature, of the irritation in some of the forms of hysteria.

That in all the cases, then, of hysterical disorder, there is a disordered state of some part or the whole of the nervous system, seems to be proved by all the phenomena, as well as by the causes which excite their appearance; but we see no reason to believe that there is always a state of vascular fulness, congestion, sub-inflammation, or any analogous condition of the bloodvessels. And, although the disorder of the nervous system may be, and very frequently is, induced by evident uterine irritation, it no less evidently arises, in other examples, from causes productive of irritation in other parts of the body, and also from causes acting directly upon the mind. If, however, we cannot concede to M. Villermay, that the ancient and revived doctrine of the invariable uterine origin of hysteria is true; neither can we agree with M. Georget to consider it, as Willis had done before, a simple disease of the brain; nor with Mr. Tate, that it is always produced by a morbid state of the spinal marrow, connected with the irregular performance of the functions of the womb.

The existence of an original susceptibility in excess in the nervous system of hysterical patients, is an assumption warranted, we conceive, by all observation. The natural or congenital constitution of the nervous system, and even of different portions of it, is most plainly discerned to be different in different individuals. From the very cradle may be observed a different degree of sensibility to impressions; and even a different countenance, impressed by the hand of nature herself, before human feelings have written their deeper lines upon it; a countenance indicative of a distinct and individual character, which is associated with an individual mode of receiving and being affected by external circumstances, and of exercising the internal faculties upon the impressions received. As the individual being grows up, the results of the original organization, modified but not changed by education and various accidents, are observed in all the varieties between stupid insensibility on the one hand, and morbid or too ready excitement and activity on the other. The excitement and the activity are in dif-

ferent individuals more conspicuously manifested in different parts of the mixed system of body and mind. Thus, some are seen to be endowed with almost inexhaustible muscular energies, and some with vast powers of intellectual perception and combination; whilst in some the functions of the mind are feeble or disturbed, and in others divers other functions are debilitated or disordered. In the hysterical patient we may observe the most intense development of susceptibility, connected with a singular proneness to irregular actions, often arising from slight causes; the natural proportion designed to exist between the impressions of the external world and the sentient human system being in them not preserved.

The various impressions which thus become the causes of hysteria, (to confine our attention to this form of their effects,) if always supposed to act by nervous excitation, yet sometimes so readily and so early excite the circulation, and without the visible antecedence of any nervous change, that the phenomena seem to be referable to the vascular disturbance. The greater susceptibility of the nervous, or greater irritability of the vascular system, in different constitutions, exercises considerable influence. It would seem as if a mental impression, or a disordered state of the stomach, or the presence of worms, flatulency, or acidity in the intestines, or a disturbed uterus, may in one case produce a direct nervous excitement, and in another act first on the heart and arteries, and, through disorder in them excited, lead to irritations in the brain and nervous system; and, lastly, through the irritation of the brain and nervous system, to disorder in several functions, different in different individuals; the respiratory organs being most affected in one, the intestines in another, the kidneys in a third, and the brain (still a secondary effect) in a fourth. The ultimate results are various; sobbing, or crying, or laughing in one case; in another, the hard and barking cough; in one, distention of the stomach and bowels, and globus; in another, diarrhoea or obstinate constipation; in one, copious urine, in another suppression; in one, confusion of mind, in another excessive caprice and love of change.

The links of such a disorder are too numerous to leave room for the affectation of laying down precise pathological rules as the measure of each case. Even another link must in some of the cases be added; for in the case of disordered stomach or bowels, for example, being the cause of the primary irritation which ends in the production of hysteria, that irritation itself, primary as it is with respect to the hysteria, is but secondary to some antecedent failure in the just performance of the vascular or nervous functions, or both, of the part in which such irritation first arises; and this failure itself may be occasioned by too great or too scanty a supply of blood, or too great or a deficient supply of nervous energy, or some other irregularity in the functions of one or both of

* *Craigie*. Elements of General Anatomy and Pathology, 1st edition, p. 429.

these systems, as relates to the constitution of the part the functions of which are first seen to be impaired. Yet it is upon a just consideration of some of these first links of a long chain that our best hope of a radical cure must in a great measure or wholly depend.

The object or final cause of all the diversified hysteric movements seems to be the equalization of the circulation of the blood, and the removal of an irritation of which the nervous system is conscious. We can recall no instance from our observation of convulsions excited without some intention, more or less obvious, to be effected in the general struggle. They commonly indicate the dominion of the irritated or pained brain, and are instinctive efforts for its relief; of which hysterical patients in particular sometimes express their own conviction.* It is justly remarked by the intelligent observer quoted below, that the muscles called into action in hysteria are chiefly those employed in *great exertions*.

Treatment.—We believe there are few disorders of which the practitioner generally undertakes the management with less willingness than hysteria. Its causes are so often obscure, or slight, and not to be wholly avoided, and its phenomena are so changeable and baffling under all kinds of treatment, that it is often left to itself, as a constitutional affection over which medicine has no power. Certainly very little benefit is to be expected from a bold and indiscriminate practice, and no immediate or striking results are to be looked for under the best considered plan of treatment; but those who take sufficient pains to ascertain the origin and complications of each case, and have perseverance enough to pursue a plan of treatment adapted to a chronic affection, and often requiring the whole health of the body and mind to be modified, will find that there are many cases, very unpromising at first sight, which may by such means be greatly relieved or wholly cured.

Cases, assuredly, occasionally present themselves, so strange in their character, and so extensive in their complications, that the practitioner who has not been led to refer their almost innumerable symptoms to some general principle may imagine that they are only created to bewilder him and to discredit his art; and be to the last degree perplexed what plan of treatment to adopt, or with what measures to begin. Referring to the notes of a single case, not long ago seen by us, we find, contemporaneously existing, or at least complained of in a continuous catalogue detailed to the ear of the practitioner by a married female, of about thirty years of age,—head-ach; pain of ears and occasional deafness; frequent loss of voice; tightness of chest; dry, loud, sonorous, and very peculiar cough;

dyspnœa; spasm about the throat, with blackness of the face supervening; pain of arms; palpitation; acute pain of the epigastrium, and sometimes in the left lumbar region; irregular appetite for food, and chiefly at night; costive bowels; very scanty and high-coloured urine, with copious whitish sediment, but sometimes abundant, and pale as water; menstruation quite suppressed, after being long defective; much pain of the lower part of the back; pain of the legs; disturbed sleep; great coldness and insensibility of the surface, particularly in the lower extremities, whilst heat applied to them produces mental excitement and a disposition to loud singing; the palpitations induced by exertion, as well as difficult breathing, cough, much agitation, and violent crying. Of such a case, a kind of epitome of all hysteric sufferings, the first view would seem to be most confused, and the first opinion most unfavourable. If the practitioner institutes a diligent search after local symptoms, he finds no satisfactory end to his search; and if he undertakes to prescribe for every symptom, as indicative of some local affection, he exhausts the art of prescription without success; new symptoms arise when old ones yield, and he at length gives up the contest in despair.

To attain clear views of the proper arrangement of these and all other gradations of the malady, it seems best, therefore, to speak of the treatment,—1. with reference to the paroxysm; 2. when hysteria depends on causes of a general nature, as plethora, or the opposite condition of various approaches to anæmia, debility, &c.; 3. when connected with uterine irritation; 4. with gastro-intestinal disorder; 5. of the treatment of some particular symptoms; and, 6. of the preventive treatment in general: we shall thus be enabled, without unnecessary subdivisions, and without neglecting complications which no arrangement can simplify, to comprehend every practical consideration of importance.

Treatment in the paroxysm.—During a fit of hysteria, the objects of all that can be done by the assistants are, to guard the patient from avoidable injury, and to shorten the duration of the fit itself. The importance of both these objects depends, of course, a good deal upon the form of the paroxysm. When there are violent muscular agitations, the patient may be seriously injured without the care of those about her; and when much pain attends the fit, or when there is deep coma or intense spasm, our anxiety must be greater to put an end to the attack.

All the details of the methods of restraint to be employed by the assistants may be resolved, whatever appearances of complexity may be given to them, into guarding the patient from injuring herself by her hands, by her teeth, or by striking the head and upper part of the body against any hard substances; and when these objects are gained, further restraint is useless, and perhaps hurtful; for the harmless although irregular actions which remain are to be considered as

* Ce sont les malades elles-mêmes qui donnent cette explication, comparant ce qui arrive dans cette circonstance à l'espèce de roideur générale que l'on oppose machinalement à toute sensation douloureuse, vive, et instantanée."—Georget.

many natural means of relief. The best way of guarding the patient from any injury from the teeth, is to put a napkin, several times folded, between them. According, however, to the degree of consciousness possessed by the patient, should the attendants endeavour, by firmness, calmness, and well-timed exhortations, to cause the person affected to exert her own power of self-controul. For this purpose the operation of fear has sometimes been resorted to; and the success which has attended it shews that the patient is capable of being roused to exertion: but if sometimes successful, it is not always safe; violent convulsions have in some instances been occasioned by it, converting a quiet form of the disorder into one of an alarming aspect.

If the symptoms indicate a forcible determination of blood to the head, no attentions in the fit will more successfully mitigate the occasional convulsive actions than such as are directed to moderating such determination. The head may be raised, and towels wrung out of cold water applied to the forehead; warmth being at the time applied to the feet. All tight clothing about the neck or chest should be loosened. In the cases going on to complete coma, even venesection may be advisable. When there is less plethora of the vessels of the head, and the fit is obstinate, the patient being at intervals able to swallow, moderate quantities of stimulants are useful; as from half a drachm to a drachm of the spiritus ammoniæ aromaticus or fœtidus, or of the spiritus ætheris aromaticus or sulphurici compositus or nitrici, given in water, medicines which are more suitable than wine or brandy, because less permanent in their effects, and yet efficacious. Advantage may be obtained in slighter cases by sprinkling the face and chest with cold water, as recommended in the article HYDROCEPHALUS for the relief of convulsions; and an abatement of the symptoms is often procured by applying stimulating scents to the nostrils, as common smelling salts: formerly, the smoke of assafœtida or of burnt feathers used to be much employed; and we have witnessed singular effects in some cases of slight convulsion from smelling common mint. More troublesome spasmodic paroxysms, frequently occurring in the fit, may render the addition of the tinctura opii, in doses of twenty or thirty drops, desirable. When the spasms are very severe, and especially when they assume the tonic form, there is commonly a degree of rigidity about the jaws which renders it difficult to administer medicine of any kind. In such circumstances the best effects are produced by enemata, particularly of assafœtida, of which one or two drachms may be so given; an ounce of the oleum terebinthina rectificatum is, perhaps, still more efficacious; we have seen complete resolution of rigid and apparently intractable spasm ensue in a few seconds after its administration in the enema domesticum: it is not necessary that the quantity of decoctum avenæ, which is the best vehicle, should be so great as when the object is to empty the colon; about ℥viii. being suf-

ficient. An enema of vinegar and water, or a mixture of these given by the mouth, are recommended by Riverius* for the suspension of the fit.

Little more can be done in the paroxysm. To keep off a paroxysm is always important; and it is sometimes accomplished by the prompt administration of ℥℥ of the pulvis ipecacuanhæ, which we have also seen repeatedly successful in suspending the morbid actions of the paroxysm, especially in the croupal form described a few pages back. Extremes of heat or of cold have been remarked to bring on the paroxysms,† and should consequently be avoided as much as may be practicable. No effort should be left unmade to induce the patient to exert herself in opposition to the paroxysm; to resist it, as much as possible, by her will, and to feel pride in overcoming it. When any premonitory symptoms are perceived, cold water should immediately be applied to the head; and some of the stimulants already mentioned may be found prophylactic. Other parts of the preventive treatment will be mentioned afterward.

Treatment when dependent on plethora.—Cases of hysteria dependent on plethora may be complicated with defect in the uterine functions, with the suppression of some habitual discharge, or the retrocession of eruptions; and their relief is then to be principally expected from the re-establishment of the defective secretion, the restoration of a discharge to which the constitution has become too much habituated to endure its sudden cessation without derangement, or the solicitation to the skin of the eruption that has prematurely receded. Much more commonly, however, the plethoric condition of those subject to hysteric fits arises from neglect of exercise and from improper diet, and is best relieved by the general treatment of plethora, on which it is unnecessary here to expatiate. We have seen very good effects from one full bleeding; but the frequent repetition of venesection will not be well borne, and may even increase the susceptibility of the nervous system, and cause the continuance of the hysterical disorder in connection with the debility thus induced. The comatose or apoplectic form of hysteria will generally be found connected with too great fulness of the cerebral vessels, demanding careful attention, for such cases have proved fatal. Any immediate danger may be averted by taking away ten or twelve ounces of blood from the arm, or, what generally gives more relief, by cupping behind the neck, or rather between the shoulders, for the practitioners must not disregard the indelible marks of the scarificators. The remaining disposition to cerebral plethora will be easily kept in check by applying a few leeches behind the ears once a fortnight, or every three or four weeks, and by causing the patient to take twice a week, in the morning, gr. ii of the submuriæ hydrargyri with ℥i or ℥℥, or more, of the pulvis

* Praxis Medica.

† Georget.

jalapæ compositus of the Edinburgh pharmacopœia, or a draught of infusum sennæ with two or three drachms of sulphas magnesiæ, and a drachm of the tinctura jalapæ. She should be directed to rise early, to take a tepid or cold shower-bath twice or thrice a week on getting up in the morning, or at night on going to bed: the diet should be moderate, and not consist of much fluid food, as broths, coffee, cocoa, tea, &c. Animal food should only be taken once a day. The patient should not indulge in late hours, nor lie on too soft a bed, nor in a close or confined apartment. Female servants have been rendered liable to hysteria in consequence of sleeping in rooms having no chimney; a fact which it may be useful to notice incidentally, although not directly connected with the subject of plethora. Walking exercise should be most strictly enjoined; the neglect of it is one of the chief causes of the general ill-health of women; they commonly neglect exercise for many days, then take it to excess; suffer from the excess and refrain from walking for many days more; and these ill-judged alternations it is very difficult to persuade them to abandon. The lamentable effects of the neglect of exercise have been pointed out in the article PHYSICAL EDUCATION: we believe that more attention is now paid to exercises and recreation in schools for young ladies than used to be the case a few years ago; and that the voluntary indolence of those who are not at school is much more general, and attended with the worst effects. The exercise taken by the patient will, of course, be various, according to her rank or situation in life: fortunately the best kind of exercise is the cheapest; and of all modes of exercise riding in a carriage is the worst, tending much more to induce than to avert a determination of blood to the head. As respects horse exercise we fully concur with Dr. Parry, who says, "with regard to riding on horseback, it is usually a mere apology for the want of that exercise which Providence evidently intended that man should take by means of his own limbs, and not those another of animal. Accordingly we find, that exclusively of the positive diseases which spring from this mode of gestation when violent, those who trust to its more moderate use, and more especially those who substitute it for accustomed bodily labour, are at least as subject to dyspepsia, gout, dropsy, hemorrhage, the whole train of nervous affections, mania, hysteria, epilepsy, paralysis and apoplexy, as those who lead the most indolent lives."* The same experienced and enlightened physician reprobated in strong terms the mental weakness which was opposed to all voluntary exertions, and which in itself, as proceeding from the neglect of proper exercise, furnished a powerful argument against it. He admirably points out the evils of very warm rooms; of late hours, which always imply so much time taken from the day, and from the animating but little heeded effects of light; and all those indulgencies for which climate or fashion furnish so many apo-

logies. And he notices the instructive fact that various animals dependent on man, and treated with similar indulgence, incur similar penalties. "Thus singing-birds and lap-dogs, which are confined and highly fed, are subject to the whole train of nervous affections; as palpitation of the heart, breathlessness on slight motion, hysteria, convulsions, epilepsy, hemiplegia, and apoplexy."

When, by inducing better habits in these respects, and taking the immediate measures already pointed out, the plethoric condition is so far reduced as to obviate the occurrence of any inconvenience from the use of antispasmodic medicines, these may be variously employed, in combination with counter-irritation along the spine, and other measures which we shall have to mention after considering the next class of cases.

Treatment of cases dependent on various degrees of debility.—Our classification must not exclude from our reader's mind those cases, not of unfrequent occurrence, in which the state of debility is combined with the state of plethora, and which require a judicious combination of several parts of the plan above laid down with that now to be mentioned.

When the general nervous susceptibility, and consequent hysteria on the supervention of slight occasional causes, are not connected with plethora or with vascular excitement of a general kind, venesection, low diet, and saline purgatives, or such as produce watery discharges from the bowels, may exceedingly increase the tendency to the disorder. Local vascular excitement in the brain, for example, or in some portion of it, or of the spinal chord, may require and be benefited by local depletion, and be relieved by external irritations, by means of blisters or the tartar-emetic ointment; but the general measures must be of a different kind. Medicines which increase the patient's strength will here be found to diminish the susceptibility of the nervous system to impressions; but they require to be given with peculiar cautions, for patients of the kind now alluded to generally profess an inability to take any tonic medicine without incurring headach, feverishness, and uncomfortable excitement. Their objections to all medicines in which they detect a bitter taste are commonly insurmountable; and the practitioner is precluded from the employment of the cinchona, cascarilla, calumba, and gentian, although some of these might really be serviceable. In such cases the best resource is found in the diluted sulphuric acid, of which seven or ten drops given in the infusum rosæ compositum, with a drachm of the compound tinctura cardamomi, will be found to form a grateful medicine, which the patient may take twice or thrice in the four-and-twenty hours with great advantage: the addition of *mxv* or *xx* of the tinctura hyoscyami will usefully allay any excess of nervous irritation. If the patient is found, as frequently happens, to make objections to chalybeate tonics, the objections will commonly be avoided by giving these most useful medicines in very small doses, without any sacrifice of their good effects. If the di-

* Op. cit. vol. ii. par. 31, 32.

luted sulphuric acid is given in distilled water, half a grain or a grain of the sulphate of iron may be given in the draught: even a quarter of a grain, or less, given in this manner, is productive of good effects: if more is deemed necessary, gr. ii. may be given in a pill with the extractum anthemidis, or the extract of gentian, night and morning. If the *tinctura ferri muriatis* can be taken without inconvenience, it may be given in doses of from seven to ten drops twice a day. We have generally found these forms of medicine less objected to by patients than the *mistura ferri composita*, although the compound iron pill is taken without complaint, and in doses of eight or ten grains twice a day is a valuable tonic. Of the *vinum ferri* we have little experience; but this or the *mistura ferri* may be given so as to avoid any real or supposed inconvenience to the patient, in combination with the decoctum aloes compositum; a combination which may be especially useful when it is desired to promote the activity of the bowels, or to excite the periodical functions of the uterus. The most delicate females can generally take the sulphate of zinc or the oxyde, in doses of a grain twice a day in the form of pill, with some bitter extract, without difficulty; and we are much disposed to think that the general effect of the mineral tonics will be most satisfactorily perceived when they are given in these moderate doses. We give this opinion as the result of our own observation; but it is only reasonable to suppose that more advantage is gained by attempting the gradual invigoration of the functions, than by suddenly calling on the organs for actions of which the vehemence is disproportioned to their power. Whytt mentions a case in which two hundred and thirty grains of the filings of iron were given daily, divided into three doses, for some months together, in a case of indigestion. The carbonate of iron has also been lately given, as is well known, in enormous quantities; but this kind of treatment does not appear to us to be at all suitable to cases of hysteria. It does not seem that the natural mineral waters of Bath, which formerly enjoyed much reputation in nervous disorders, have of late years been much resorted to by nervous, or at least by hysterical patients; a fact of which we are assured by an obliging communication from Dr. Barlow, but which we have learnt with some surprise. If due care was taken to recommend their use in cases where the hysterical affection was connected with a debilitated constitution, we cannot doubt that it would be attended with great advantage. But the real merits of mineral waters are often lost in a meretricious flame: whilst fashion dictates their employment, they are used indiscriminately; and when the fickleness of fashion leaves them unpatronised, their good effects are no longer thought of.

The warm, sulphureous waters of Cauterets and Bagnales (Bagnoles) are mentioned by Sauvages as being useful in the *hysterica chlorotica*. About four pints are directed to be drunk daily for three days, and a bath is to be taken on the fourth; and the use of the waters

and the bathing are to be thus continued for a month. Those of Seltzer, Spa, Vichy, Barèges, Pyrmont, and Carlsbad, have been recommended.

Sydenham had great confidence in the effects of a milk diet in cases of great debility. He also thought highly of the infusion of various bitters in canary wine, and says that he sometimes advised hysterical women to drink a large draught of canary by itself at bedtime for some nights in succession, and that they were eminently relieved by it, "the whole body having been much strengthened, and such as were before cachectic becoming fresh-coloured and brisk thereby." He also very strongly recommends horse exercise.

To the ammoniatum cupri and nitras argenti, which have sometimes been given on account of their possessing not only a tonic property, but a specific power of allaying nervous irritability, we have never had recourse in hysteria. With the intention of improving the general health, we should especially recommend either the tepid shower-bath of sea-water or of salt and water every other morning; or the sponging of the greater part of the whole of the surface of the body with salt and water every morning. The warm sea-bath may be useful, or, if the patient can bear it, bathing in the open sea.

Change of climate, even within our own island, may become an object of consideration, by way of avoiding extremes of heat or cold. No medical practitioner of observation is now sceptical concerning the effects of changes of weather as well as of climate. We would ourselves generally undertake to predicate, from the actual state of the weather, the situation in which we should find patients of known susceptibility to impressions, or nervousness; and have often noticed their especial discomfort in warm and showery seasons, their continued indisposition in low, sheltered, warm residences, and their as certain relief when removed to a hilly locality. Some of these effects are perhaps accounted for by the variable weight of the atmosphere in various seasons, its lightness always seeming to produce oppression by permitting the expansion of the circulating fluids, except in particular constitutions, to whom such expansion seems to be suitable; other effects may be the mere result of temperature on the nervous substance; and some we should be inclined to ascribe to electrical variations which have not yet received adequate attention.

The refreshing air of Malvern, of the heights of Clifton, or that of the northern parts of the island, may be useful in the warmer seasons. Of that of Malvern we can speak confidently, as regards its surprising effects on pale languid females, whose appearance and health begin to improve almost as soon as they remove thither; it has this great advantage, also, that it may be enjoyed without exposure to the dissipations which seem to form an essential part of a fashionable watering-place. It is mortifying to observe how frequently weak and nervous patients, relying on a succession of medicines without end, neglect, in spite of every exhortation and every indication of reason, the best

tonic and nervous medicine of all, and one which they can always procure by slight exertion—we mean the cool and pure air of the earlier hours of the day. If they cannot deny the unfavourable influence of passing twelve hours out of every twenty-four in the close atmosphere of a bed-room, the conviction has seldom any effect upon their habits. To supply the strength thus lost, recourse is had to various stimulants, and the result is often the total destruction of health and comfort, and the conversion of all the years after forty into “a long disease.”

The effect of various impressions on the mind is always to be considered in cases of benefit derived from change of air. A sea-voyage, therefore, or a journey attended with many incidents, and with some difficulties, has sometimes been found to be very serviceable. The wives of officers, delicate and hysterical in the languor of country quarters, have lost their complaints amidst the fatigues or dangers of a march. The ladies of Paris forgot their hysterical affections, we are told, in the French revolution, and the Irish ladies in the rebellion, although exposed to many and violent impressions. Cullen noticed similar effects in the ladies of Scotland in the civil war of 1745-46; and Dr. Rush, in a curious paper “On the Influence of the American Revolution on the Human Body,” says that many hysterical women, who were much interested in the successful issue of the contest, “were restored to perfect health by the events of the time, change of place, occupation,” &c.* Dr. Parry has recorded some remarkable instances illustrative of the same principle;† and Dr. Bright observes that a severe nurse in a ward will sometimes cause hysterical disorders to be less inveterate there than in other wards.‡

Ease and indulgence seem always to exasperate this disorder. The daughters of cottagers removed to the kitchens of people in comfortable circumstances, often become hysterical. The wives of merchants, Frank remarks, are affected with hysteria in flourishing times; but when reverses come, they “have no time to be ill.”§

In both classes of cases the treatment of which has now been spoken of, periods occur in which neither the proper remedies for plethora, nor those usually suitable to states of mere debility, will do all that is required. The plethoric tendency may be controuled, and the susceptibility, the tendency to irregular and spasmodic actions, yet remain; and the same may be the case both where every thing has been done to counteract debility, and where the patient, although manifestly weak, cannot bear many of the usual means of restoring the strength. It is in these cases that a watchful practitioner will find periods in which anti-hysterical, or antispasmodic, stimulant, or seda-

tive medicines, may be prescribed with the happiest results. We do not here so much allude to opium, henbane, conium, and medicines of that description, which are generally only given with temporary advantage in cases of hysteria; but to assafoetida, musk, valerian, and other means which appear to be not only antispasmodic, but directly to decrease the morbid susceptibility of the nervous system. First in the list we should place the gummi resina assafoetida, the chief of those “fetid medicines” which, in the language of Sydenham, “are calculated to compose the tumultuary motion of the spirits,” and were therefore anciently called *hysterics*. The assafoetida is, indeed, a medicine which we have found particularly useful; and, if the patient will submit to take a very nauseous mixture, the *mistura assafoetida* (the old *milk* of assafoetida) is perhaps the most efficacious form in which it can be given. Each ounce of this mixture contains gr. xv. of the gum resin, and either $\mathfrak{z}\text{i}$ or $\mathfrak{z}\text{ss}$ may be given three or four times a day, in cases in which the patient is subject to very frequent attacks. It is, however, often necessary to give this disagreeable medicine in pills: in either form much confidence may be placed in it. If genuine musk could commonly be procured, its prescription in doses of gr. xv. three times a-day would probably be equally or even more efficacious: it is certainly a valuable medicine. The *mistura moschi* of the pharmacopœia, containing in each $\mathfrak{z}\text{ss}$. of aq. rosæ gr. xv. of musk, is one of the most convenient formulæ for the use of the practitioner. The utility of both the assafoetida and the musk will be the most conspicuous in cases in which the surface is pale and the pulse languid. The castoreum has been much recommended; and the tincture, and still more the compound tincture of the Edinburgh pharmacopœia, in which it is combined with assafoetida, may be usefully added to other medicines in doses of one or two drachms. The effects of valerian are occasionally very striking. Idiosyncrasies seem to exist, which render different anti-hysterical medicines of paramount service in different cases; and in some of the forms of hysteria the valerian is a specific. As many patients cannot bear the powder, the *infusum valerianæ* of the pharmacopœia of Dublin may be conveniently prescribed: we are ourselves most familiar with its effects in the form of the *tinctura valerianæ ammoniata*; and particularly in the hysterical headach, to be presently spoken of. The *oleum succini* has sometimes been recommended in hysteria, but we do not think that either in its simple form, or in that of the *spiritus ammoniæ succinatus*, it is now much employed.

Although we feel convinced that there are, as we have said, periods in almost all cases in which antispasmodics are most serviceable, there are no medicines which will more surely disappoint the practitioner who trusts entirely to them, or employs them indiscriminately. In many cases it must be remembered that the means of reducing vascular action, or, on the other hand, the means of improving the general strength, are the best antispasmodics, and

* Medical Inquiries and Observations, vol. i, Philadelphia and London, 1794.

† Posth. Works, vol. i, p. 368-9.

‡ Op. cit.

§ Op. cit. cap. xiv.

more truly anti-hysterical than any specifics which can be employed.

The restless nights and various uneasy feelings of hysterical patients make it in many cases absolutely necessary to have recourse to anodynes. The extracts of hyoscyamus and conium, with camphor; the tinctura opii, or tinctura camphoræ composita; the acetate or muriate of morphia, the liquor opii sedativus, the Dover's powder, or opium alone, will be suitable in different circumstances: but the disposition of hysterical patients to continue the use of these medicines, and to take them in large quantities, should be carefully discouraged.

Treatment of cases dependent on uterine disorder.—Independently of all the parts of the general treatment of hysteria, these cases require especial attention, different according to the precise disorder existing in the uterus. If amenorrhœa is present, which we have stated that we consider *not* a very common circumstance, the practitioner must have recourse to the proper treatment as described under that head. (See AMENORRHOEA.) If, as more frequently happens, there is too frequent or too copious menstruation, a form of disease in young females which is even more difficult to be managed, attention to the general health will be found the most important; although sometimes astringent medicines are decidedly useful. We have known marked advantage derived from taking six or eight grains of the pulvis kino compositus with a few grains of alum two or three times a-day; but when medicines of this kind are given, the supervention of headach, with a hot and dry skin and feverishness, will sometimes compel their discontinuance. There is usually in such cases what may be termed an irritable state of the uterus, indicated by pain in the hypogastric region, in the sacrum, along the upper edge of the ossa ilia, and down the thighs; with leucorrhœa, and a quick and feeble pulse: the os uteri is tender to the touch, and there is a disposition to organic disease: the digestive organs are almost always in these instances considerably disturbed. Cupping on the loins, leeches to the epigastric region, or to the vagina or the os uteri itself, anodyne enemata, fomentations, rest in the horizontal position, the frequent use of the hip-bath, and temporary separation a marito, and a most careful avoidance of irritating purgatives, are among the measures most to be recommended in such cases. For the addition of anti-hysterical or tonic remedies no rules can be laid down; the judgment of the practitioner must entirely regulate their administration in each case: they will often be found necessary even when the uterine irritation is relieved.

Some of the French practitioners lay more stress than we are accustomed to do in this country on particular articles of diet, and substances introduced in enemata, in occasioning uterine excitement and hysteria. Crabs, mussels, onions, truffles, aromatic chocolate, vanilla, and cinnamon, are enumerated by M. Louyer Villermay as having these effects; and he adds

perhaps strawberries and raspberries, but more certainly too nourishing, spiced, and heating aliments, wines, spirits, and every excess. He further mentions pastilles, into the composition of which the powder or tincture of cantharides enter; and also enemata of drastic, irritating, and poisonous plants, which he says have often caused nymphomania with convulsions, terminating in death.*

Treatment of cases dependent on gastrointestinal disorder.—These cases may require little more than the simple treatment of indigestion (for which we refer the reader to the article INDIGESTION) as preparatory to the administration of antispasmodic medicines. If there is much tension of the abdomen, with uneasiness, and some tenderness on pressure, the cure will be very much hastened by the application of from six to twelve leeches to the epigastrium. This practice, recommended by Dr. Wilson Philip in particular stages of indigestion, we have seen the immediate advantage of in innumerable instances; constantly observing the utility of medicines after such application, which had been fruitlessly persevered in before. If the lower part of the abdomen is tumid and uneasy, the leeches may with more advantage be applied to the orifice of the rectum. But this tenderness is by no means constant in hysterical cases; and the distention of the abdomen is seldom permanent, but rather comes on and subsides with some suddenness, and is then shewn by many symptoms to be dependent on flatus. Temporary relief may be obtained in the attacks from carminatives; as the compound tincture of cardamoms in aqua menthæ piperitæ, aqua carui, or aqua cinnamomi, or a little spiritus ætheris aromatici in camphor mixture; or even a few drops of the oleum carui on sugar. The importance of giving relief in these attacks of flatus depends less on their severity, although that is considerable, than on their tendency to induce the hysterical paroxysm. The measures from which we have seen the most permanent efficacy are the administration of the warm gums and purgatives at night, or night and morning, and of bitter medicines with an alkali twice a day; with strict attention to diet and to clothing. Eight or ten grains of the pilulæ aloes et assafœtidæ of Edinburgh, or equal parts of the compound extract of colocynth and of the pilulæ galbani compositæ, have seemed to be of essential service: the inactivity of the bowels often requires an aperient draught to be given in the morning; in which case the decoctum aloes compositum is preferable to salts and senna. Whytt recommends pills of assafœtida, extract of aloes, and sulphate of iron: we have found pills of the sulphate of iron, extract of aloes, and extract of gentian, very beneficial: the tinctura muriatis ferri, or a draught of equal parts of infusum gentianæ compositum and aqua menthæ, with the carbonate of potass or of soda, twice a day, are also useful. The state of the stomach and bowels is often improved by giving small

* Dictionnaire de Médecine, Art. *Hysterie*.

alterative doses of the pilula hydrargyri; but the practitioner should never forget, that although nervous patients are more than all others sensible of the immediate relief derived from taking a dose of the blue pill or of calomel, there are none on whom the penalties of taking these medicines too often or in excess, are more certainly and more painfully exacted, in the shape of increased nervous susceptibility, which may thus indeed be exasperated to the extremest sensitiveness, and even to madness.

External applications, in the form of emplastra, are perhaps too little regarded in modern practice; we are persuaded that much benefit is sometimes obtained by the application of a good-sized emplastrum galbani compositum to the abdomen, as well as occasionally by a mercurial plaster. A broad bandage of flannel is sometimes useful, and the daily use of the flesh-brush and friction. We have not found any form of bathing very serviceable in this description of cases.

Attention to the diet of these patients is of great importance: they generally find it necessary to avoid fluids and vegetables, except in small quantities. Moderate meals, at regular and sufficient intervals, should be recommended to them, rest in the horizontal position for an hour after eating, and afterwards exercise: a glass or two of sherry after dinner will generally be found useful to them, or small quantities of brandy and water. Porter, ale, and beer, seldom agree with them. One of the benefits of not drinking at dinner, a rule in itself not warranted by natural instinct, is that it causes the patient to eat less: large draughts of beer or soda water are decidedly improper.

If there is reason to suppose that the hysteria is almost wholly dependent on confined bowels, the continued use of the compound aloetic pills will perhaps be found more productive of relief than the most complicated treatment which can be devised. Large and unsuspected collections of fecal matter are frequently lodged in the colon, and remain or re-accumulate, unless the practitioner perseveres in the treatment calculated to remove them.

When the hysteria is connected with the presence of worms in the stomach or bowels, recourse may be had to anthelmintics: except in the case of tænia, however, against which the oleum terebinthinæ may almost be said to be infallible, the best vermifuges will be found in the means already detailed.

Among the complications of hysteria we have already mentioned that of the intestinal with uterine irritation; and the cases which we have just described will often be found to be considerably aggravated at the menstrual periods. We are convinced, however, that in many such examples the uterine irritation is neither first in order nor in importance. No sequence is, in fact, more familiar in pathology than that of irritation of other mucous membranes supervening on that of the intestinal canal.*

The vehement pulsation of the aorta, which was also mentioned, sometimes depends on intestinal disorder.

Treatment of particular symptoms.—Concerning these it will not be necessary that much should be added to what has already been laid down respecting treatment; but the practitioner will be disappointed if he looks for the retreat of some of these troublesome complaints even when attacked according to all the rules of art. Theoretical writers, vain of their science, but unversed, as it would appear, in the perplexities of practice, are too ready to deride empirical modes of relief, and to believe that their general maxims are all comprehensive. Thus M. Louyer Villermay, maintaining the uterine theory, disregards the condition of other organs; and M. Georget, treating the uterine theory with ridicule, asserts that as hysteria is a disease of the brain, it is idle to prescribe for the stomach, or the heart, or the lungs; and seriously advises "pills of crumbs of bread and other substances of like energy, and for drink, water and tisanes of equal virtue." Whoever sees much of hysteria will soon become satisfied that such practices would be singularly useless, and that even when every general means has been attended to, there are particular attentions which cannot be neglected without disadvantage.

The hysterical headach is best relieved by the tinctura valerianæ ammoniata in doses of ʒiʒ, with an equal quantity of sp. æth. sulph. comp., or of sp. lavand. comp., or of the tincture of hyoscyamus, in camphor mixture. A drachm of the simple tincture of valerian, and ten or fifteen drops of acidum sulphuricum dilutum, taken twice a day, with or without ʒi of the tinctura cinchonæ, is also a useful medicine. The application of cold to the head, the frequent use of the shower-bath, and of pediluvia of warm water, may be resorted to with benefit. Although blisters behind the ears are in these instances, and in those of hysterical pains about the face, usually productive of much temporary irritation, their employment is often followed by relief. In very obstinate pains, as in nearly all obstinate chronic disorders, a gentle course of mercury has occasionally proved useful.*

For the relief of those cases in which the symptoms of phrenitis are simulated, rest, quietness, opiates, and, according to circumstances, purgatives, and the usual means of equalising the circulation, will generally be found efficacious; and stronger measures are not hastily to be resorted to.

In the hysterical asthma, in addition to the ordinary treatment of cases in which there is much nervous irritability, the patient may take pills of equal parts of ammoniacum and squill, or of ammoniacum and assafetida. Dr. Whytt recommends equal parts of the two latter in aqua pulegii. We have seen evident relief from plasters of assafetida and ammoniacum applied to the chest. These cases also often require particular attention at the monthly

* The reader is referred for an illustration of this important principle to the article ASTHMA, vol. i. p. 194.

* Whytt.

periods, when small doses of the sulphas magnesiae, with the tincture of hyoscyamus, given in the mistura camphoræ, will sometimes be found to ward off threatening symptoms.

Of all forms of hysteria none are so obstinate as those attended with pain in the left side. We have not found it so constantly connected with tenderness of the spine, nor so uniformly dependent on uterine disorder, as Mr. Tate seems to have done. As regards all local treatment of the side itself, we believe it to be a mere waste of time; nor can we speak with much confidence of medicines. We have generally found it difficult, sometimes impossible, to produce proper counter-irritation in the side; but, on the whole, have seen more advantage gained from repeated applications of the tartar emetic ointment to the spine than from any other means. After many trials, we prefer using ointment of the strength of a drachm of the antimonium tartarizatum to 3ii or 3iii of cerate; one application, the part being previously sponged with hot vinegar, being often sufficient to produce numerous small pustules, by the repeated evocation of which we have thought the patient much more benefited than by the same counter-irritant applied as a plaster or in any other degree of strength. In our experience, the advantage derived by the patient from the use of this ointment is not generally increased in proportion to the suffering it occasions. Leeches, and a succession of small blisters to the spine, are in some cases still more serviceable than the ointment.

These cases are very unsatisfactory. The patient sometimes continues an invalid for one or two years, and at length recovers without appearing to be under much obligation to medicine; or sinks into a state of atrophy, hardly able to take any nourishment, a prey to every morbid feeling, and a burthen to herself and to all about her.* The tenderness of the dorsal spine and the pain about the sacrum have been accurately pointed out by Mr. Tate, who has also given some very striking cases in which relief followed his practice in them. Dr. Darwall had previously called the attention of the profession to the tenderness and spinal irritation, and Mr. Griffin has published some interesting cases of it in the *London Medical and Physical Journal*. Mr. Tate apprehends that the accompanying pain in the side is seated in the intercostal nerve; although he says he has sometimes thought it must be situated in the nerves of the heart itself. The right side, however, is occasionally the seat of suffering; and we have not observed that the pain, even when in the left side, was often attended with palpitation: a sense of weight is very commonly complained of. We have proposed acupuncture with sanguine expectations of success, which have ended in disappointment. In one case we noticed complete relief ensuing on the coming out of a vesicular eruption in the situation of the pain, and in

another on the appearance of an ovoid tumour, which subsequently subsided without suppuration. Dr. Whytt, to prove that "complaints of the nervous or hysteric kind often proceed from some morbid humour in the blood," adduces cases in which "an itching between the toes, red pustules appearing on the breast and belly, or some other cutaneous eruption," produced relief.* Much of the difficulty in these peculiar cases arises from the morbid state of the patient's mind: she supposes that she cannot walk or move, or bear the shower-bath and other means; and the kind attentions which it would be inhumanity to withhold from such apparent afflictions seem to make them more intractable.

Hysterical palpitation is often almost instantaneously relieved by the valerian, or yields to its more continued use. The danger of repeated bleedings in these cases is extreme, or, at least, the mischief thus induced is incurable. The hysterical diabetes will probably be best treated by opium, blisters, or plasters to the loins, flannel worn next the skin, and other parts of the general treatment: spurious symptoms of calculus in the ureters will yield to anodynes and laxative enemata; and attention to the state of the bowels and surface will best keep off the attacks. The great violence of the pain in these cases sometimes leads the practitioner to use the lancet and other means, which are generally superfluous and often very detrimental to the patient.

In the mutable cases, in which various diseases seem to succeed each other with rapidity, each new aspect of the malady may require new resources; but the general principles of treatment must be kept steadily in view.

We have not spoken in this article of electricity, galvanism, or electro-galvanism, agents which have occasionally been employed in the cure of hysteria; we fear that their application has hitherto done little more than prove the inveteracy of some forms of the disorder. (See *ELECTRICITY AND GALVANISM*.)

It may here be observed that hysterical women are very generally disqualified for being good nurses. Sometimes the performance of that function may be serviceable to them, but they generally perform it inefficiently; their liability to feel all impressions too keenly, and the violent agitations of feeling and temper which belong to them, operating unfavourably on the secretion of milk, and causing disturbance in the child's bowels, and perhaps in its nervous system.

No part of pathology or practice is more unsatisfactory in its present state, or at the same time more promising of future results, than that which relates to the conditions of the blood. If any cases of hysteria could be clearly traced to peculiar states of that fluid, productive of nervous irritation, the object of our treatment would of course be to effect an alteration in it. The means of doing so would be the regulation of diet, the improvement of the digestion, attention to any function obviously deranged,

* For an extreme example see Dr. Bright's Reports of Cases, vol. ii.

* Op. cit. chap. iv.

and a careful general regimen. The effects which have ensued in some recent experiments in which saline substances have been directly injected into the veins, would seem to point to very important results. And if the practitioners residing at watering-places had been less satisfied with general assertions of the universal virtues of the mineral waters of their respective localities, and more observant of the actual operation of these serviceable agents in chronic maladies, reasons might have been found for ascribing some part of the benefit derived from them to their effects on the circulating fluids rather than on the bowels, effects which have long been admitted in the case of the chalybeates, but hardly ever hinted at as regards the saline waters. We should desiderate, however, the perfect establishment of facts indicative of such advantages before we should be disposed to send hysterical, and fanciful, and susceptible patients to places resorted to by so many whose idleness and selfishness are their chief complaints. It is not in places devoted in an especial manner to every weak and luxurious indulgence, and in which the honours of medical science cede too often to a miserable waiting upon the caprices of spoiled adults, that we can expect hysterical females to acquire habits of bodily or of intellectual health.

Preventive treatment.—When a young lady has had an hysterical attack of some severity, much anxiety is commonly felt to prevent a recurrence of it; and this may in the generality of cases be thus early prevented by proper attention to the causes which appeared to bring on the attack, and to any peculiarity in the state of her health which has predisposed to it. Where there has been no severe and marked paroxysm, and yet many of the peculiarities of the hysterical temperament exist, the preventive treatment is too often neglected, whilst in the examples in which it assumes peculiar and embarrassing forms, the nature of the disorder is often misunderstood, or, after very insufficient trials, medical and moral means of relief are abandoned.

A careful education may undoubtedly prevent the increase of a susceptibility observed to be naturally too intense; but, although it would be easy to lay down regulations for the accomplishment of so desirable a purpose, it would manifest a great want of experience in the ways and weaknesses of mankind to expect such regulations to be followed with much perseverance. As regards schools, however, it is but just to acknowledge that of late years much more attention has been paid to allowing hours for relaxation and exercise than formerly. Yet the exercises of ladies' schools are often absurdly enough ordered; the natural amusements of running, leaping, and playing at various active games in the open air being considered ungentle, and, by a strange inconsistency, the rigid positions of the drill sergeant, the fixed distortion and torture of the feet in stocks, as inculcated by dancing mistresses, the difficult poises and attitudes of a system which is termed calisthenic, and some-

times the exercises of tumblers, the climbing of ropes, and the rubbing of tables, are among the approved means of avoiding at once both deformity and the vulgarity of rude and boisterous health. Meanwhile, the nature of their studies is such as hardly to merit the name of mental cultivation. Ostentatious efforts are made to crowd the elements of many accomplishments into a few years, and if the young lady is not afterwards *finished* by those who profess to instil taste as well as art, and who succeed in effacing all natural and simple tastes and traits of character, she commonly remains unskilled even in accomplishments; whilst the want of all love of literature or acquaintance with science, and consequently of all companionable qualities of a higher kind, diffuses an ennui over society that every one feels without thinking of its source, and by which the whole moveable community is driven about from one place of public resort to another, without useful objects, without attachments, without duties; leading to the habitual neglect of all self-government and the creation of much domestic wretchedness. After the confinement of school, the young female is introduced into fashionable life, and exposed to numerous causes of debilitated health. Returning for a few seasons to London blooming from the coast or the country, she leaves town in June the shadow of herself, often bearing in her countenance not only the marks of dissipation, but of expectations disappointed, wounded pride, and a disposition from which all the attractive frankness of youth has been carefully rooted out. Then, perhaps, ensue the mortifications of celibacy, and the misery of growing old without an active and contented mind. Concerning the evil effects of these and many other circumstances, the physician may feel a thorough conviction, but as the circumstances are not much within his controul, it would be useless to dwell upon them in the present article. As causes of disease, and especially of hysterical and other various disorders, none will deny their wide and powerful influence but those who have paid no reflection to the operation of human passions in society. From the circles of nobility these follies flow to the families of the country gentry, and from them to the upper ranks of country towns, whose inferiors of every degree imitate them as well as their daily necessities will permit. The dictates of health, of reason, of happiness, are lost in the love of false greatness and over-refinement which hangs over empires devoted to decay. But against such habits it avails little to protest; the physician cannot obviate them, nor are they "curable by any herbs."

He may, however, often with more success devote some portion of his care to the preservation of a healthy body. If every function is well performed, the nervous system will, it is probable, soon become freed from the morbid susceptibility which disposes the young female on receiving any slight impression to the irregular actions of hysteria. It has so often been found useful in chronic disorders of

an obstinate nature to place the patient in new circumstances, and thus to change the whole series of impressions to which she is exposed, that this resource should not be overlooked. With this intention the hours of rising and taking food, the times of exercise and rest, the nature of the mental occupations and of the bodily exercises, should no longer be the same as customary. Change of scene, change of climate, change of manner of clothing, may all form parts of such a plan. So many of these changes are effected at once by a removal to a watering-place, or to the sea, that the advantage of such a change may overbalance all other considerations, and be advised with great propriety.

Nor should it be forgotten that the different parts of what is called an alterative treatment often induce most important changes by slow operations, seemingly effected in the actions or condition of the nervous or vascular systems, or wrought upon less obvious sources of continued malady, existing perhaps in the secretory processes. (See ALTERNATIVES.)

By the means now enumerated, numerous, as always happens in diseases little obedient to the healing art, and requiring consequently much discrimination in the practitioner who employs them, there is no doubt that many cases of hysteria may be completely cured, and that almost all cases may be more or less relieved. The constitutional susceptibility in some instances of the disorder is so great that relief is all that can be effected, and the protracted character of the malady often leads to its being too soon withdrawn from the care of the physician. Where this is not the case, we believe the failure of the treatment is generally to be ascribed to a want of patience, an insufficient employment of the various resources which we possess, or a want of conformity and perseverance on the part of the patient herself.

Even a palliative treatment, if nothing more can be immediately promised, should not be disregarded either by the patient or the practitioner, it being unquestionably true, as Dr. Whytt has remarked, that "long-continued palliation may sometimes make a cure; for while the palliative remedies lessen the bad effects of this disorder of the nerves, nature, either by herself or with their assistance, at length expels or subdues the morbid cause." The practical wisdom of this observation may be remembered with advantage in the treatment of all chronic diseases.

We have dwelt longer on the affections united under the name of hysteria than we should have done if we did not know that it is always a peculiar disadvantage to the practitioner to decide, or to be expected to decide, at once upon a plan of treatment of which the immediate effects are to be observable in each hysterical case. It seemed to us that their proper treatment might be facilitated by considering them with reference to their various origin and complications somewhat more closely than had before been done. The best chance of effecting a perfect cure in any

case will depend on the deliberation with which all the circumstances connected with it are considered: the origin, the causes, the duration of the malady, and the present state of the patient, well and duly reflected upon, will usually lead to means of eventual relief, to which hasty and presumptuous prescription can seldom or never attain.

(J. Conolly.)

ICHTHYOSIS,* (from *ἰχθυς*, a fish,) *fish-skin*, a cutaneous disease, named from its supposed resemblance to the skin of a fish. In our opinion, Willan and Bateman have erred in classing it in the order *Squamæ*, as it has a much nearer affinity to the papular than to the scaly eruptions. It is characterised by a harsh, papillary, or horny condition of the skin. In other instances, the papillæ are elongated into horny peduncles bearing a broad irregular top. Whatever be the cause of this morbid growth, it appears to have a close affinity to that state which produces the common wart. These excrescences frequently suffer partial exfoliation, which affords the scaly appearance that probably may have led to the present arrangement of the disease.

Instead of the division of the genus into the two species, *ichthyosis simplex* and *ichthyosis cornea*, it would be more consonant with experience to divide it into, 1. *ichthyosis fortuita*; and, 2. *ichthyosis innata*.

In both species of the disease the eruption sometimes appears on distinct portions of the body, whilst the rest of the skin retains its healthy appearance; sometimes it extends over the whole of the surface, except the hairy scalp; and although it is observed directly above and below the flexures of the joints, yet it seldom appears on or around the joints, or, as Dr. Bateman remarks, on the inner and upper parts of the thighs. It also rarely appears in the axillæ, upon the palms of the hands, or on the soles of the feet.

Species 1. *Ichthyosis fortuita*, (*ichthyosis simplex* of Willan and Bateman) not unfrequently affects only the extremities, and occasionally the face. The more extended form of the disease is common in children who come from India at rather a later period than usual. It rarely makes its appearance for the first time in adults, and appears to commence by a soiled appearance of the cuticle, followed by a thickened, papillary, and discoloured condition of the skin, which seems, to a casual observer, the effect of want of cleanliness. By degrees the hardness and roughness increase, so as to afford to the finger, when passed over the skin, the sensation caused by a rough file, or shagreen. The colour of the patches soon deepens to a dirty, brownish-black hue; and when carefully examined, they are found to be composed of small pedunculated horny excrescences, closely impinging upon one another; or, when the disease is general over the body, of conical horny excres-

* *Syn. Lepro ichthyosis* (Saww.); *Lepidosis ichthyosis* (Young, Good).

cences, the apexes of which are generally loose and separating, so as to give the appearance of being covered with dirty, coarse meal. In some instances these horny papillæ are crowded in various groups, following the variations of the cuticular lines: in other instances they form decided patches, like incrustations upon the part; and when the peduncles are long, and the clothes press upon the parts, the papillæ overlay one another like scales; but in no case do they naturally assume an imbricated or scaly aspect. The patches are occasionally separated by whitish furrows; in some cases, when they are distinct, they terminate abruptly, in others they are gradually lost in the healthy skin. When the face is the seat of the disease, it is usually confined to the cheeks; but in a case mentioned by Dr. Bateman,* and another, in a young lady, which came under our own care, the patches on the cheeks communicated across the nose, so as to produce the appearance of a pair of large brown spectacles laid upon the face:† in some instances the mammæ in females have appeared completely encased in this horny covering. If the excrescences be picked off, or if they fall off when submitted to the action of the vapour of hot water, they rapidly grow again; but, in the interim, the skin does not bear any trace of inflammation; it appears in a healthy state until the papillæ re-assume their former horny aspect. In the case of the young lady referred to, the disease, which made its appearance about the age of puberty, was preceded by considerable constitutional disturbance, namely, headach, disordered bowels, cold feet, and flushings of the face; but in general no premonitory symptoms have been observed; nor is the eruption accompanied with itching, tingling, or any uncomfortable feelings. The whole skin, in the more extended form of the disease, is dry, and its perspiratory function apparently impeded; it has been suggested that the urine and the pulmonary exhalations balance the defective perspiration, and maintain the general health of the habit.‡ Biett mentions that in some instances the sound or uncovered parts of the skin perspire more than usual.

Few opportunities of ascertaining the condition of the constitution or that of the skin in this disease, have occurred to us; but the few which have presented themselves have confirmed the view we have given, namely, that it cannot be regarded as a scaly eruption. The chorion is found to be thicker than usual, and the furrows which traverse it are deeper than common: the horny papillæ are readily detached by maceration. But these investigations have shed very little light upon the nature of the disease.

Treatment.—The obstinate nature of this eruption has in many instances resisted every plan of treatment, both local and general. With the exception of the decoction of the root of rumex

obtusifolius, no internal remedy appears to have at any time produced benefit. The decoction of this dock root, made with an ounce of the sliced root and a quart of water, boiled down to a pint, and taken in doses of a fluid ounce and a half twice or three times a day, purges briskly, and clears the skin in ten or twelve days; but in cases of long continuance the eruption is likely to return. Dr. Willan strongly recommended pitch, made into pills with flour or some farinaceous matter; the dose being gradually increased until twenty or thirty of the pills are taken in the course of the day. The pitch seems to operate by stimulating the capillary system, so as not only to enable the skin to throw off the patches of horny cuticle, but to restore the skin to its natural and healthy state.* Arsenic is sometimes useful on the same principle; but the experience of those who have had the best opportunities of seeing and treating the disease, affords little encouragement to prescribe it. The dock-root, the use of which was first recommended by the writer of this article, is certainly the most effectual remedy which has been hitherto employed: the only objection is its disposition to purge, which, however, can be moderated by the addition of ten or twelve drops of laudanum.

In old cases, when the eruption returns, and is successively removed by the decoction of the dock-root, the obstinacy of the case often depends upon a state of the skin which is sometimes only to be permanently relieved by the application of blisters over the whole of the diseased surface; this was the case in the instance of the young lady already mentioned.

With regard to external means, almost every stimulant and detersive plaster and ointment has been tried, and each in its turn declared nugatory. The scales have been picked or shaved off, and removed in various ways, but in the greater number of instances without any permanent advantage. Mr. Plumbe found the firm application of adhesive straps aid greatly the desquamation, if this term may be employed, of the patches; the diseased cuticle was softened, and might be scraped off without pain. "By persevering," says Mr. Plumbe, "in this plan, the skin gradually acquires a healthy texture."† Sulphur fumigating-baths have been found useful, and the benefit received is undoubtedly more permanent than when the common sulphureous baths of Harrowgate, or similar springs, are employed; but, nevertheless, in several instances in which we have seen the fumigating baths used, the eruption has returned after they were discontinued. Whatever applications are used, the daily employment of the warm bath, with friction whilst in the bath, and brisk exercise taken immediately afterwards, materially aids the restoration of the healthy condition of the skin. The bath should be used in the morning.

* Dr. Willan generally ordered at first three or four five-grain pills to be taken three times a day; and the number of pills to be gradually increased until a drachm of the pitch was taken for a dose.

† Practical Treatise on Diseases of the Skin, 1st edit. p. 334.

* Synopsis, 7th edit. p. 80.

† Ibidem, nota.

‡ Rayer, Maladies de la Peau, tom. ii. p. 305.

Species 2. *Ichthyosis innata*.—This congenital form of ichthyosis, although scarcely perceptible at birth, yet even at that period may be recognised by the skin being harsher and thicker than usual in infants, and rough when the finger is passed over it. By degrees, as the infant grows, the disease assumes its proper character. In almost every recorded instance the disease has been hereditary. As in the fortuitous species of the disease, the rigid and scaly state of the skin is sometimes partial, sometimes general, assuming the appearance as if the body was covered with a coat of mail. The case of the native of Suffolk, known by the name of the "Porcupine Man," and described by Mr. Baker in the forty-ninth volume of the Philosophical Transactions, is the best illustration of this form of the congenital disease. The face, the palms of the hands, and the soles of the feet, were the only parts free from the scaly covering. The disease appeared about two months after birth, and the scales regularly dropped off every winter and re-appeared in the spring. The individual enjoyed excellent health, and had six children, all of whom were covered with the same excrescences. Many other curious examples of congenital ichthyosis are to be found in the Royal Transactions and the memoirs of the various scientific societies throughout Europe; but as no means that have hitherto been tried have proved successful in restoring the healthy texture of the skin, it is unnecessary to refer to them.

The ichthyosis *cornea*, horny fish-skin of Willan and Bateman, the *cornua cutanea* of Plenck,* the *appendices cornés* of Rayer,† has been improperly confounded with the congenital form of ichthyosis by Bateman and Rayer; but the horny appendages constituting this affection, which cannot be regarded as a species of ichthyosis, are rarely if ever congenital, and differ in every respect from the horny papillæ of ichthyosis. "They are," as Bateman expresses himself, "purely of cuticular growth, consisting of a laminated callous substance, contorted and irregular in form, and not unlike isinglass in appearance and texture." In every instance they are accidental, and generally connected with some diseased growth, such as wart;‡ or they arise in the cavity of encysted tumours of very slow growth. Their extirpation belongs to the province of surgery; the only effectual remedy being excision and the ample destruction of the surface secreting them, at an early period.

(A. T. Thomson.)

ICTERUS.—See JAUNDICE.

IDENTITY, PERSONAL.—The question of personal identity becomes not unfrequently a matter of vital importance in both civil and criminal investigations.

* Doctrina de morbis cutaneis.

† Maladies de la Peau, tom. ii. p. 315.

‡ Morgagni, de Sedibus et Causis Morborum, ep. 65, art. 2. *Avicenna*, canon. iv. fen. 7, tract. iii. cap. iv. *Lorry*, de Morbis Cutaneis, p. 519.

1. Thus it may be doubted whether a child claiming an inheritance is the same that he pretends or is pretended to be, as in the celebrated Douglas* or Anglesea† causes; or long absence of the owner of property may give rise to a similar doubt, as happened in the following instance related by Zacchias.‡

A noble Bolognese, named A. Casali, left his country at an early age and joined the army. He was supposed to have lost his life in the wars; but after an absence of thirty years he returned and claimed his property, which his heirs had already appropriated to themselves. Although there were some marks which appeared to identify him, yet the change in appearance was so great, that none who remembered the youth were willing to allow that this was the individual. He was arrested and imprisoned. The judges were in great doubt, and consulted Zacchias whether the human countenance could be so changed as to render it impossible to recognise the person. His opinion was in the affirmative; in consequence of which, and because the heirs could not prove the death of Casali, the judges restored to him his name and estates.§

Thus it might happen that the true heir would not be able to prove his right merely by failing to establish his identity; while, on the other hand, an impostor may succeed where he has no claim, merely by the force of resemblance. One of the most remarkable instances of such an occurrence is that of Martin Guerre, which came before the parliament of Toulouse in 1560.

Martin Guerre had been away only eight years, when a certain Arnauld Dutille, depending on his likeness to the absent person, formed the design of taking his place, and actually took possession of the property and wife of the true Martin. Children were born of this union, and he lived in the family more than three years, with the four sisters and two brothers-in-law of Martin, without being suspected. At length, however, it became matter of trial, and three hundred witnesses were examined; thirty or forty of whom deposed that the new comer was really Martin Guerre, with whom they had been on habits of the closest intimacy. Nearly an equal number swore that he was Arnauld Dutille; while the others were so perplexed by the resemblance between the parties that they would not venture to affirm whether the individual before them was the one or the other. The judges also were completely puzzled, and were on the point of deciding in favour of Dutille, when the arrival of the true Martin exposed the imposture; though to the last the effrontery and impudence of Dutille led many to doubt, and even Martin himself appeared confounded;

* See Journals of the House of Lords, and also Speeches and Arguments, &c. of the Lords of Session of Scotland in the Douglas Trial. London, 1767.

† For the Anglesea trials see 17 and 18 Howel St. Tri. and Harg. St. Tri.

‡ Quest. Med. Legal. Consilium 61.

§ See also Foderé, vol. i. p. 109.

so that the judges were still more embarrassed than before his arrival. At last, however, he was fully identified and recognised by his wife and sisters.*

2. Secondly, in criminal prosecutions the question has very frequently arisen, whether a prisoner is actually the person who committed the offence with which he stands charged; or, where a prisoner after conviction escapes and is retaken, whether he is the same person that was convicted. The same question also applies in cases of return from banishment.

In connexion with this branch of the subject, circumstances have repeatedly occurred evincing the vital importance of the accuracy which should furnish grounds of evidence; and the extreme caution by which witnesses or prosecutors should be guided in depositions. A few years since a gentleman coming into Dublin late in the evening, was stopped and robbed by a footpad. A man was arrested by the police under suspicious circumstances, and, being recognised by the gentleman, was committed to abide his trial, when he was identified by the prosecutor in the most positive manner; in consequence of which he was found guilty, but, owing to previous good character, recommended to mercy. In a very few days afterwards, the gentleman was surprised and horror-struck at meeting on the road the man who had really robbed him.

The mistake here appeared to arise from the imperfect light in which the robbery had taken place, and naturally suggests for our consideration a question which has given rise to some discussion, and appears to require notice here, viz. *the degree of light which may be necessary to enable an observer to distinguish the features, so that the person may be afterwards identified.*

In a case which occurred in France in 1809, of a person shot at night, it was stated that the flash of the pistol enabled the witness to identify the features of the assassin. The possibility of this was referred to the Institute, who reported against it. Foderé, on the other hand, believes that if the persons be at a small distance from each other, and the night very dark, such an event might be by no means impossible.

A case in point occurred in England in 1799. A man named Haines was indicted for maliciously and feloniously shooting at Edwards, Jones, and Dowson, Bow-street officers, on the highway. Edwards deposed that, in consequence of several robberies near Hounslow, he, together with Jones and Dowson, were employed to scour that neighbourhood; and that they accordingly set off in a post-chaise on an evening in November, when they were attacked near Bedfont by two persons on horseback, one of whom stationed himself at the head of the horses, and the other went to the side of the chaise. The night was dark; but he swore that, from the flash of the pistols, he could distinctly see that the man rode a dark-brown horse between thirteen and fourteen

hands high, of a very remarkable shape, having a square head and very thick shoulders; and altogether such that he could pick him out of fifty horses: he had afterwards recognised the horse. He also perceived, by the same flash of light, that the man at the chaise-door had on a rough-shag brown great coat.

A lady, a patient of the writer, lately told him that on one occasion, on her passage from India, she awoke in the middle of the night and heard some one stirring in her cabin, but could see nothing, it being quite dark; when suddenly the cabin was so completely illuminated by a flash of lightning, that she could see distinctly a man rummaging one of her trunks, and discerned his features so accurately that she identified him next morning: some of the stolen things were found upon him, and he subsequently acknowledged the fact.

We were once present at a trial when a witness swore that the prisoner at the bar was one of a party who attacked and burnt his house, and that he saw him, at a distance of more than ten yards, in the act of putting a burning coal into the thatch; the night being *so bright* that he could distinctly recognise his features at that distance. This occurred in the middle of December. Subsequently, a gentleman of undoubted veracity swore that he recollected the night of the attack, and that it was *so dark* that he could not see his horse's head as he rode along! On reference to the almanack, it was found that the moon was at the time in her last quarter.

The extraordinary resemblance which is occasionally observed between two individuals furnishes another ground for extreme caution in swearing to the identity of a prisoner not absolutely taken in ipso facto.

At the Old Bailey in 1822 Joseph Redman was indicted for assaulting and robbing Wm. Brown. The prosecutor, on his cross-examination, stated that he knew a man named Greenwood, who, with his hat on, so much resembled the prisoner that he should hardly know one from the other; Greenwood was in custody, and was brought to the bar, when the extreme similarity between the two men struck every one present with astonishment. Redman proved an alibi, and the jury returned a verdict of not guilty.

The case of the Perreaus was a remarkable illustration of this fact. Daniel and Robert Perreau were twin brothers, and in 1775 were tried and executed for a forgery on Mr. Adair. So great was the resemblance between them, that Mr. Watson, a money scrivener, who had drawn eight bonds by order of one or other of the brothers, hesitated to fix upon either; but being pressed to make a positive declaration, he at length fixed upon Daniel. The name of these unfortunate men is familiar to the public from the well-known exclamation of George III., when asked to pardon Dr. Dodd,—“If I save Dodd, I shall have murdered the Perreaus.”

A very remarkable instance of personal resemblance was for some years under our own observation in the sons of a poor peasant.

* From the *Causés Célèbres*.

They were twins, and so much alike, that one of them, who was very wild, used frequently to bribe his brother to change clothes with him, and go home to take a beating in his place; the father having no other means of distinguishing them except by their dress.

An individual was indicted and tried at New York in 1804 on a charge of bigamy, and the whole evidence turned on the question of his identity. He was called Thomas Hoag by the public prosecutor, but stated himself to be Joseph Parker. Several witnesses swore that he was Thomas Hoag, among whom was a female whom he had married and deserted. It was stated that Hoag had a scar on his forehead, a small mark on his neck, and that his speech was quick and lisping. All these peculiarities were found on the prisoner. Two witnesses deposed that Hoag had a scar under his foot, occasioned by his treading upon a drawing-knife, and that this scar was easy to be seen, and had been seen by them. On examining his feet in open court, *no scar was to be found on either of them*; and it was further proved, that at the time of his alleged courtship of the second wife in Westchester county, he was doing duty as a watchman in the city of New York. The jury acquitted him.*

3. We must not omit to mention the necessity that occasionally occurs for identifying the dead, as in cases of murder, accidental death, exhumed bodies, &c., cases which not unfrequently present themselves under very embarrassing circumstances.

In January 1817, the body of a woman was found tied to a boat near Greenwich Hospital, and an inquest was accordingly held, but adjourned on account of vague evidence. At the second sitting an old man declared the deceased to be his daughter, who had been the wife of an out-pensioner, and between whom and her husband a fight had taken place with sharp instruments in his presence; that soon afterwards both parties left his house, and he had not heard of them since. Other witnesses also supported the statement that it was the body of the old man's daughter. A second adjournment took place. The constables in the mean time had sought in vain for the husband, but *they found the wife alive*, and she was produced accordingly. The coroner reprimanded the witnesses, though the strong likeness between the living and the dead woman was allowed to be sufficient to impose on even better judges.†

In swearing to the identity of a dead person, witnesses should be very cautious how they assume any except indelible marks as means of recognition, because so complete an alteration takes place in the features and general appearance soon after death as to deceive even the nearest relatives. A trial took place some years ago in Edinburgh, which illustrates satisfactorily this part of our subject. A prosecution was instituted against four medical students for exhuming the body of a lady. The

body was so disfigured that it could not be identified by the friends; the ovaries were, however, examined, and it was reported that there was found in one of them a perfect corpus luteum, which would be sufficient to prove that the remains were not those of the lady in question, who was a virgin, and advanced in years. On the trial there was a total contradiction between the medical witnesses as to the corpus luteum, but the body was afterwards identified by a dentist who produced a cast of the gums which he had taken before death.

Even under circumstances apparently less difficult great doubt may exist as to identity. A resurrection man was lately tried before the high court of judicature in Edinburgh for raising the body of a young woman from the church-yard of Stirling. Nine weeks after death, the body was discovered and identified by all the relations, not only by the features, but by a mark which they believed could not be mistaken, she being lame of the left leg, which was shorter than the right. There was a good deal of curious swearing as to the length of time after death that the body could be recognised, but the jury was convinced that the *libel was proven*, and gave a verdict accordingly. "Now, I am certain," adds the relater* of this case, "that this was not the body of the woman who was taken from the church-yard of Stirling, but one that, at least six weeks after the time libelled, was buried in the church-yard of Falkirk, from which she was taken by this man, who also had taken the other, for which he was tried; she also was lame of the left leg: thus, though guilty of the offence laid to his charge, he was found guilty by a mistake of the *corpus delicti*."

4. From the foregoing cases may be collected a general view of the facts or circumstances likely to engage the attention of a witness, or a court, in cases where the identity of an individual may be doubted or disputed, and of the circumspection necessary in giving testimony on such a subject; in doing which we ought always to keep in view the following considerations, at least.

Seeing the great resemblance that may exist between different persons, we should hardly ever, after a lapse of any considerable time, trust to our mere recollection of external form or peculiarity of features, except we are able to connect these with some indelible or unalterable mark, such as *nævi*, *cicatrices* produced by disease or operations, congenital malformations; with reference to which object it would be very desirable that medical men practising midwifery should in all cases note down along with the other circumstances of time of birth, &c. any bodily peculiarity of the infant by which it might afterwards be recognized. We once detected by this means an attempt at substitution of a child, which would otherwise have certainly succeeded.

We should remember and make allowance

* Beck's Medical Jurisprudence, p. 223.

† Smith's Principles of Forensic Medicine, p. 500.

* See Beck's Elements of Medical Jurisprudence, p. 223, note, signed *Dunlop*.

for the great alteration that may be made in the person and countenance by the mere lapse of time, especially at the season of life when youth is matured into manhood, and by altered habits. When the brethren of Joseph stood before him, "they knew him not." If to time be added the effects of a hot or very cold climate, or disease, the pressure of mental anxiety or bodily hardship, the effects are still more striking :

Danger, long travel, want or woe
Soon change the form that best we know ;
For deadly fear can time outgo,
And blanch at once the hair :
Hard toil can roughen form and face,
And want can quench the eye's bright grace,
Nor does old age a wrinkle trace
More deeply than despair.*

The return of Ulysses, and his rejection from his own halls, unknown by all, and recognised by his faithful dog alone, although probably no more than a poet's fiction, has been realised in more instances than that of Casali.

In conclusion, it appears to us that in the case of a person seeking to establish a claim by proving his identity, a more certain mode of examination would be to question the person himself as to his knowledge of facts, however trifling in themselves, but of which he must have had cognizance if really the person he pretends.

(W. F. Montgomery.)

IMPETIGO, *humid or running tetter*,† (from *impeto*, to infest), is a non-contagious, pustular affection of the skin, terminating in thick lamellated scabs or thin scaly crusts. Willan and Bateman, who are followed by Bielt and Rayer, enumerate five species of impetigo; but in our opinion there are only two distinct species, the one unattended by febrile symptoms, the other preceded by them; the first three forms of impetigo may be ranked as varieties. We therefore propose the following arrangement :

Spec. 1. *Impetigo simplex*.

Var. a. *Impetigo figurata*.

b. *Impetigo sparsa*.

c. *Impetigo scabida*.

2. *Impetigo erysipelatodes*.

The first of these species (*impetigo simplex*) appears generally without any obvious premonitory symptoms, attacks chiefly the young, and those of a lymphatic temperament; and displays itself in clusters and groups of psudracious, or irregular, slightly elevated, small pustules, which, after discharging their contents, continue to exude a thin, acrid ichor, accompanied with much itching, or rather stinging, and a sensation of heat. This discharge concretes into thin, yellowish, semi-diaphanous scabs, which turn up at the edges, so as to allow the discharge to ooze from under them. The disease is frequently chronic, or

kept up by successive eruptions of the groups of pustules. The two first varieties of this species are founded on the manner in which these patches of eruption appear; whether large, circumscribed, oval, or some other regular figure; or small, disseminated, and assuming no peculiar form: the third variety is distinguished by forming one continuous crust over the affected part.

Impetigo figurata. This variety of simple impetigo generally occupies the face, appearing most frequently on the cheeks, the chin, the sides of the nose and margin of the nostrils: the extremities, particularly the hands, are often the seat of the eruption; it occasionally, also, appears upon the trunk of the body. Although, in general, this variety occurs without any obvious diseased state of the general habit, yet it occasionally follows much mental anxiety, or other depressing affections of the mind, in which case it is accompanied with cardialgia and uneasiness of the stomach, with a sensation of weariness of the limbs, and other indications of low febrile disturbance. At first the patches are small, distinct, red spots, which itch considerably: in a short time, however, they enlarge and are covered with minute yellow psudracious pustules, closely crowded so as to be almost confluent, and surrounded by a red inflamed border. The pustules are flat, and are the source of much heat and stinging pains. In a few days they burst, and discharge their contents; the pus drying and changing into thin semi-transparent crusts, which characterize this species of impetigo; sometimes, however, the scab is thicker and not unlike "the exudation of gum on a cherry-tree."* If these scabs fall or are rubbed off, the surface appears red, excoriated, shining as if stretched, and exhibiting minute pores from which an ichorous discharge exudes, which greatly augments the heat and smarting. On the margin of these diseased patches, unbroken psudracious pustules may be observed. When the disease is not perpetuated by successive eruptions, the crusts gradually dry, and remain nearly stationary for two or three weeks, the itching, heat, and smarting gradually diminishing; they then fall off, leaving the surface red, stretched and shining, and the cuticle so thin as to be liable to excoriation from the slightest friction. More frequently, however, the ichorous discharge is reproduced, accompanied with fresh crops of psudracious pustules; and the eruption is thus repeatedly renewed and runs its whole course; continuing for many months, sometimes for years. When the disease yields either spontaneously or to the influence of medicine, the amendment is first perceptible in the centre of the patches; and sometimes, even when this occurs, the border not only retains its diseased character, but fresh pustules shew themselves: as the cure proceeds, however, these also gradually disappear, and the whole skin acquires its natural

* Scott's Marmion.

† *Syn. Lepra squamosa* (auctor. var.); koubia (*Avicenna*); *ecpthisis impetigo* (*Good*); *phlysis impetigo* (*Young*); *dartre crustace* (*Fr.*); *der kleinausatz* (*German*); *cowrap* (*Javanese*); *herez* (*Arabic*).

* *Rayer, Traité Theorique et Pratique, tom. i. p. 474.*

aspect, except that it is covered with minute scales, which are reproduced for an indefinite time, more or less protracted according to the severity of the previous disease.

This variety of impetigo simplex does not always preserve the uniform course which has been described. Sometimes the patches enlarge by successive marginal crops; this is particularly the case when they appear on the legs, which are thus often gradually covered from above the knee to the instep. In some instances, the pustules are intermixed with transparent vesicles, not unlike those of some of the varieties of herpes; indeed there seems to be some affinity between the causes of herpes and impetigo; as the two diseases occasionally appear simultaneously upon the same individual. We have at present a case of severe herpes *zona* under treatment, in a man who has scarcely recovered from a protracted attack of impetigo *sparsa*. When these vesicles break, the ichor which they pour out is much more acrimonious than that of the pustules: wherever it touches the sound skin, inflammation and a crop of vesicles or psudracious pustules follows. The vesicles appear in tardy succession, and are slower in their progress than the psudracia: when broken, they are little disposed to heal; and the constant irritation of the ichor inflames the cuticle, thickens it, and covers it with small ulcers. In this state of the disease the burning sensation and itching are extremely distressing, and much increased by friction, or any source of irritation, or even any application, however emollient.

Impetigo *sparsa* differs from the former variety chiefly in the irregular and scattered distribution of the pustules: these appear in small groups, dispersed without any regular order in the extremities, about the neck and shoulders, and occasionally on the face, the ears, and scalp. They run the same course as those of impetigo *figurata*, but the scabs which succeed the bursting of the pustules are thicker, more friable, and do not form in so large plates as the former variety: the surrounding inflammation is, however, more extensive, and they oftener terminate in ulceration, interspersed with fissures,* and not unfrequently are accompanied with œdema.

Impetigo *scabida* of Willan and Bateman† is merely a more severe form of the last variety. It commonly appears on the legs; and the pustules are so numerous, and discharge so abundantly, that the greater part of the limb becomes incased in a yellow crust, variously divided by deep fissures, and not unlike the bark of a tree. When it extends over the joints, the movements of the limb become difficult and painful; and the heat, itching, and tingling are greater than in either of the former varieties. When any portion of this crust spontaneously separates, or when it is removed, the vacuity is quickly filled up by

the copious discharge poured out from the excoriated surface; the limb generally swells, and if the eruption extend to the toes, the nails drop off, and the new ones are thick, irregular in their form, and notched.

The causes of these varieties of the simple impetigo are very obscure. There seems to be a peculiar predisposition to the disease connected with the sanguine or the sanguineo-melancholic temperament, with a thin lax state of cuticle. We have already stated that impetigo *figurata* is sometimes preceded by gastric derangements, languor, and headach; and this is true of the other varieties; but more generally it cannot be traced to any derangement of the digestive function. In the predisposed, however, it has been observed to follow violent exercise, intemperance, or the use of tainted animal food; and, like some other cutaneous eruptions, it has been traced to mental agitation and to sudden causes of depression, such as disappointment, grief, and fear;* and occasionally to exposure to cold. The first variety in particular seems, also, to be connected with an irritable condition of the system, such as accompanies dentition in infants, and the appearance of the catamenia in women. The third variety does not appear to be influenced by the changes of season, but the first is liable to recur in the spring, and the second in the autumn, often continuing through the winter and disappearing in summer.

Some external irritants acting upon the skin produce pustular tetter closely resembling those of impetigo *sparsa*; in this way the eruptions termed grocer's and bricklayer's itch is produced; the former arising from the acrid stimulus of raw sugar, the latter from that of lime, acting on the hands and arms of those who are constantly handling these substances. In both cases the disease is readily distinguished from scabies; it is not contagious, and soon disappears when the sources of irritation are removed. Bateman regards the pustular eruption arising from the application of tartar emetic, and various stimulating plasters to the skin, as displaying some affinity to impetigo; but the pustules are of a very different character, distinct, elevated, and seated on a hard inflamed base, which is never the case in any of the varieties of this eruption.

Diagnosis.—The foregoing varieties of impetigo may be confounded with several other cutaneous affections, but attention to two or three of the most obvious characters common to all the varieties furnishes us with the means of forming a correct diagnosis. Thus the nature of the crusts distinguishes impetigo from eczema, which is, besides, a vesicular disease; and from porrigo larvalis and favosa. Impetigo *figurata* appearing on the face may be recognized also by the character of the crusts, which are thick, soft, and cellular in porrigo, and do not dis-

* See Atlas of Delineations of Cutaneous Eruptions, pl. xv.

† Practical Synopsis, 7th edit. p. 222.

* Med. Trans. vol. i. art. 2. Med. Obs. and Inq. vol. i. art. 19. Pract. Synopsis, 7th edit. p. 214. nota.

charge thin ichor, but thick glutinous pus. The hard inflamed base of the pustules of ecthyma prevents impetigo from being confounded with that eruption; and although, in its advanced stage, impetigo is frequently mistaken for lepra and psoriasis, yet the diagnosis is not obscure, if we discriminate between the scaly exfoliations of the latter and the laminated crusts of the former, or the ichorous discharge of the pustules of impetigo, and the complete absence of all fluid discharge in lepra and psoriasis. Between impetigo and scabies the diagnosis is not more difficult: the distribution of the eruption in patches; the copious discharge of ichor; the rough and fissured cuticle; and the heat and tingling which accompany the itching in impetigo, are sufficient guides for recognizing the disease. It is more likely to be mistaken for some of the syphilitic scabby eruptions, especially when these appear on the face. A case of this kind is mentioned as having occurred under M. Bielt, in the hospital of Saint Louis, and having been treated for some time as impetigo *figurata*; but the nature of the scabs, which are large, black, thick, very adherent, resting upon a violet-coloured base, and when separated, leaving deep ulcerations, with the regular, circular form of the eruption, are generally sufficient to distinguish this syphilitic eruption from impetigo.

Prognosis.—The only circumstance to be attended to in the prognosis of impetigo is the disposition which the eruption always shews to recur: it is more likely to prove obstinate in old people, and in weakened states of the system, than in the young and robust; but under no circumstances can it be regarded as a fatal disease.

Treatment.—The same treatment is applicable to all the varieties of simple impetigo. The internal administration of sulphur, either alone or combined with soda, nitre, and the bi-tartrate of potassa, is strongly recommended by Willan and Bateman in the commencement of the disease; but our experience leads us to agree with MM. Cazenave and Schedel, that the preparations of sulphur have been too indiscriminately employed, and that they have frequently proved hurtful, aggravating the symptoms, and favouring the disposition of the eruption to re-appear. The sedative and cooling influence of conium in the common effervescing mixture, with the aid of emollient fomentations, or even of simple tepid water, constitute the best and most efficient means in the incipient stage of any of the three varieties which have been described. In cases of impetigo *figurata* extending over a considerable portion of the skin, particularly when it attacks the face, M. Bielt recommends moderate bloodletting, either local or general; we have never ordered either, and indeed cannot exactly conceive how the abstraction of blood is likely to prove useful. When fever accompanies the eruption, we have found no difficulty in controuling it by antimonials and calomel.

If simple impetigo proves obstinate, an alterative course of mercurials, either hydrargy-

rum cum creta or Plummer's pill, with sarsaparilla or decoction of cinchona bark, is generally supposed to be indispensable; but we have found the occasional administration of five or six grains of calomel at bed-time, followed by a brisk cathartic next morning, and the arsenical solution given in the decoction of elm bark three times a day, more beneficial. In many habits, indeed, the skin is peculiarly sensitive to the stimulus of mercury, whether internally administered or applied to the surface; in these cases in particular, mercurial alteratives prove hurtful. Every description of local application has at one time or another been employed in impetigo; in some cases even the most soothing and emollient cannot be endured; in others the most stimulant have been applied with advantage. When the discharge is profuse, ointments prepared either with the oxide of zinc, or the white precipitate of mercury, or the subacetate of lead, have been found most useful in moderating the quantity of the discharge, and allaying the irritation. In a drier and less irritable state of the eruption, the ointment of the nitrate of mercury diluted with six or seven parts of lard or of simple ointment, or the tar ointment, will be found advantageous in securing a more healthy surface when the crusts separate. We have also seen an ointment formed by triturating two drachms of sub-nitrate of bismuth with an ounce of simple ointment very serviceable in this condition of the eruption. In the thickly encrusted state of the limbs, in impetigo *scabida*, no local application will prove beneficial until the incrustations are removed, which is best effected by poultices, or by exposing the limb to the vapour of hot water: after the crusts are removed, the surface should be covered with pledgets of lint, thickly covered with any of the mild ointments above mentioned, or touching the whole with a solution of nitrate of silver.

In many instances the irritation is scarcely supportable: in such cases we suggested, some years ago, the use of the hydrocyanic acid, in the proportion of half a fluid drachm to two fluid ounces of water, with half a drachm of alcohol, and two or three grains of acetate of lead, as a lotion which not only soothes the irritation, but disposes the skin to regain its healthy action: subsequent experience has sufficiently established the value of this application. It is proper, however, to mention that Mr. Plumbe met with two cases in which its application was followed by considerable intermission of the pulse, which ceased on discontinuing the use of the lotion; but in these cases both legs were affected, and the lotion was consequently most extensively applied, which may in some degree account for the effect it produced. We have never met with any unpleasant result, although we have most extensively employed this form of lotion.

In very obstinate chronic cases of impetigo, the baths of Harrowgate, or the artificial sulphur fumigating baths, generally prove effec-

tual, not only in clearing away the eruption, but likewise in preventing its return. With the same view the waters of Barèges, Enghien, Bonnes, and some other of the continental springs, and also the warm sea-water bath, followed by a course of sea-bathing, have proved highly beneficial. In every stage of the disease, the advantage to be anticipated from any plan of treatment depends much on the discrimination of the practitioner. In cases accompanied with much irritability of surface, the internal means should be of a sedative kind; and local applications, with the exception of tepid water, should be wholly abstained from, until some abatement of the irritability admits of the employment of the hydrocyanic acid lotion. In the opposite condition of the disease, the moderately stimulant ointments, with the internal employment of the arsenical solution, will be found the most effectual mode of treating these forms of this troublesome disease. Under all circumstances the diet of the patient should be milk and farinaceous matters, with a very moderate proportion of animal food once a day; wine, spirits, and every description of fermented liquor, must be sedulously avoided.

Impetigo *erysipelatodes*, the second species of this eruptive disease, closely resembles, in its commencement, the ordinary appearances of erysipelas, with slight febrile symptoms, which are followed by a puffy swelling of the upper part of the face, accompanied with redness and an oedematous state of the eyelids. The inflamed surface, on close examination and running the finger over it, appears papular, and in a day or two it becomes covered with psudracious pustules, that break and discharge a hot acrid fluid, which irritates and often excoriates the sound surface on which it flows. This state of the eruption, which often covers the greater part of the face, and extends to the neck and chest, is attended with the same heat, itching, and tingling, that accompanies the varieties of simple impetigo: it continues in this condition for some days, the discharge, as it diminishes, concreting and forming thin yellow scabs, in the interstices between which fresh pustules appear, and run the course already described. The disease continues for an uncertain period, sometimes for two or three months, and, in disappearing, it leaves the skin red, shining, and in the dry brittle state which follows the other varieties of impetigo.

This form of impetigo is liable to be confounded with eczema *impetiginodes* in the commencement, even by those acquainted with both diseases; in the advanced stage, however, the pustular form of the eruption sufficiently characterizes it. In some instances of the impetiginous eczema, a few psudracious pustules may be observed intermingled with its vesicles, but the latter greatly prevail.

Treatment.—The febrile symptoms which precede this eruption indicate the necessity of antiphlogistic measures in the commencement. Saline purgatives, with antimonials and nitre, generally alleviate the fever, after which decoction of cinchona bark, acidulated either with

muriatic or diluted sulphuric acid, may be administered with advantage. When the after stage of the disease proves particularly troublesome, and runs on for two or three months, a slight alterative course with sarsaparilla generally succeeds in completing the cure; or when it can be obtained, much benefit is derived from sea-bathing, or a course of Harrogate water. As local applications, nothing farther is required than tepid ablution, and guarding the excoriated surfaces with the ointment of oxide of zinc.

With respect to a supposed species of impetigo described by Willan and Bateman, under the title *impetigo rodens*, we have never seen the disease, and are rather disposed to regard it as a variety of malignant ulcer, complicated with psudracia.

(A. T. Thomson.)

IMPOTENCE.—*Impotence* or the incapacity of sexual intercourse, and *sterility* or the inability of procreation without loss of the power of copulation, are subjects which require to be considered, first as physiological questions, involving the consideration of all the causes temporary as well as permanent from which these defects may arise; and secondly, as a medico-legal subject, forming disqualifications for the matrimonial state, or affording pleas in exculpation of alleged rape or affiliation.

Impotence may exist either in the male or female; it is, however, most commonly found in the male, as from the nature and conformation of the genital organs in the female, physical impediments to coition more rarely occur, and she is generally enabled to admit the venereal congress at least in a passive manner. Sterility, on the other hand, is nearly confined to the female, for if the male be capable of accomplishing the act of coition, including of course the ejaculatio seminis, no farther question as to his virility can arise.

The causes of impotence may be divided into three classes: 1. organic; 2. functional; 3. moral.

In the human species, as in all the warm-blooded vertebrated animals, the procreation of the species is effected by a congress of the two sexes, and a variety of organs are provided, upon the integrity of which the due performance of this function mainly depends. The male is destined to furnish a peculiar fecundating secretion, which is to be deposited in the body of the female, and for this purpose he is furnished with glands which prepare this fluid, and also with a conduit by which it is conveyed to its proper destination; while the female, being the recipient, offers a cavity into which this secretion is received, and is, moreover, furnished with an organ where the embryo is originally produced by the specific action of the fluid from the male.

Without attempting to enter into an explanation of the process of generation, which has been rightly designated as "one of those mysteries which the present state of our knowledge does not enable us to explain or even to

comprehend,"* it may be admitted as the result of observation and experiment, that a failure in any part of this complicated apparatus is attended by impotence or sterility.

I. *Impotence in the male.*—In order to effect procreation he must possess all the organs of generation in a state capable of performing their respective functions, and this leads us to the first class of causes of impotence.

1. *Organic.*—Organic impotence may proceed from different sources; there may be, (a) deficiency of some of the organs of generation; (b) malformation of these organs; (c) diseases of some of them, or of the parts in their immediate neighbourhood, sufficient to impede the procreative function.

(a) *Deficiency of the penis, whether natural or accidental,* is an absolute cause of impotence. A congenital deficiency of this organ is very rare, but it has been observed. "J'ai traité et guéri," says Fodéré, "d'une incontinence d'urine un jeune soldat plein de courage et de vigueur, qui, avec des testicules bien conformés, n'avait à la place de la verge q'un bouton, comme un mamelon, par lequel se terminait l'uretre. Il m'assura avoir été toujours ainsi, et que ce bouton se renflait quelquefois en la présence des jeunes personnes du sexe, et qu'il en sortait par le frottement une humeur blanche."† Accidental deficiency of the penis is more common. This may arise from amputation or destruction by disease. In a subject lately procured for the purpose of dissection in the College of Surgeons, Dublin, the writer witnessed an instance of complete deficiency of the penis from operation. In this subject, which was a very old man, the amputation had been performed so long before death that the cicatrix was nearly obliterated, and many who saw the case supposed it to have been one of congenital deficiency.

It is difficult to determine the extent to which the penis may be mutilated without destruction of the power of procreation. The glans has been frequently lost without being attended by impotence, and both corpora cavernosa have been destroyed, but the urethra being preserved, the individual retained his virility.‡ Frank also states an instance of a gun-shot wound of the penis which carried away so much of the organ that it remained curved after cicatrization, nevertheless it served the purpose of procreation.§ From these and numerous similar instances, as well as from the effects produced on the generative function by that malformation, to be presently considered, termed *hypospadias*, it would appear that in order to insure impotence there must be complete deprivation of the penis, as a remnant capable of entering the vagina is sufficient for impregnation.

That the testicle is the only essential organ concerned in the secretion of semen is now

generally admitted, an opinion supported by comparative anatomy, as well as by the daily proofs we have in the castration of animals. A different opinion formerly prevailed, chiefly on the authority of Aristotle, who was led to deny the necessity for the existence of testicles from having seen a bull capable of impregnating a female after castration. But he was led into error by not being aware that if copulation were performed immediately after castration, the quantity of semen retained in the vesiculæ seminales would confer fertility on the coitus. The complete absence of the testicles then, whether natural or accidental, must render the individual unfruitful.

Congenital deficiency of the testicles is a very rare occurrence, if it ever takes place. Fodéré doubts that it does, and the case adduced by Cabrolomy of a soldier addicted to sexual pleasures in whose body no testicles were found, although the vesiculæ seminales were distended with semen, has been supposed by Portal to have been one of those instances in which the testicles are retained in the abdomen during the whole of life, and that they thus escaped observation. It is not to be inferred that an individual is impotent or sterile in whom no testicles are found in the scrotum. We know that in some instances these organs do not descend from the abdomen for some time after birth, and instances are not wanting in which this delay is prolonged through the whole period of existence. In order to distinguish if the absence of the testicles be real or not, it is necessary to enquire on the one hand into the previous history of the individual, and on the other into his present condition and general habit. The first may indicate the previous existence of these organs in the scrotum, and their removal by operation or accident, in which case the external marks of mutilation, such as cicatrices, will be apparent. We do not think, generally speaking, that an absolute congenital deficiency of testicles can take place without producing in the constitution the general phenomena by which the character of the male is obliterated, and that of the female simulated. In these cases of apparent absence of testicles, therefore, if the usual general signs of virility are observed, if masculine activity and vigour, combined with a well developed muscular system, a strong deep voice, with the usual covering of hair on the chin, breast, and pubis, and at the same time no cicatrix indicating castration, are present, we must be cautious in condemning the individual. However, it is necessary to be circumspect in inductions from the general habit. Marc knew a man in Paris whose features, thin beard, smallness of hands and feet, and voice altogether feminine, indicated a defect in genital organization, yet in whom none such existed; the testicles occupied their proper situation, and the man had many children.* Fodéré considered the retention of the testicles in the abdomen as a source of increased vigour and fecundating power. "Ces organes paraissant

* Bostock's Physiology, vol. 1, p. 72.

† Médecine Légale, tom. 1, p. 364.

‡ Paris and Fonblanque, Med. Jur. vol. 1, p. 205.

§ Delect. Opusc. Medic., tom. iv. p. 313.

* Dict. des Sciences Méd. Art. *Impuissance*.

tirer du bain chaud ou il se trouvent plongés, plus d'aptitude à la sécrétion, que lorsqu'ils sont descendus au dehors dans leurs enveloppes ordinaires."* This is at variance with the opinion of Hunter, whose views on the subject seem more correct, as he considers the delay in the descent of the testicles to arise from imperfection in their development. However, this imperfection does not go the length of rendering the organ useless, and therefore, when the other signs of virility are present, we are not justified in taking the absence of the testicles from their usual situation as an absolute proof of impotence. "Nous avons vu en France, dit Voltaire, trois frères de la plus grand naissance, dont l'un possédoit trois testicules, l'autre n'en avoit qu'un seul, et le troisième n'en avoit point d'apparens; ce dernier étoit le plus vigoureux des trois."†

Complete extirpation of the testicles, although it deprives the individual of the power of procreation, is yet not accompanied by total extinction of venereal desire, and it has been observed that eunuchs of this description retain the power of copulation in an imperfect manner. This is so well known in the East, that the eunuchs who have charge of the seraglios are deprived of the penis as well as of the testicles. This power in the castrato is alluded to by Juvenal,‡ and it is said that the unfortunate victims of avarice and bad taste in modern Italy are by no means deficient in capability of erection and penetration. However, this imperfect power of copulation does not remove such persons from the class of impotent, as the most important part of the function, the emissio seminis, is wanting. Monorchides, or persons with but one testicle, are not deprived of the power of procreation. This was at one time doubted, and in the year 1665 the parliament of Paris decided that such an imperfection rendered the matrimonial contract invalid. But numerous instances in man, as well as in the inferior animals, have completely disproved that opinion. It must be admitted, however, that if the remaining testicle be small, extenuated, and withered, and if a sufficient length of time has been passed in unfruitful matrimony, such a development must afford a strong probability of sterility.

(b) *Malformation.*—Impotence may be absolute when the genital organs exist, but are malformed or pathologically altered.

The penis varies from the natural formation in different ways that have been accounted causes of impotence. Mere diminutiveness of this organ, where the subject is otherwise vigorous, cannot be included under this head; and it would appear that the genital organs, although originally of diminutive size, are capable of considerable development even after the age of puberty. Of this the case related by Mr. Wilson is a good example. "I was," says he, "some years ago consulted by a gentleman on the point of marriage respecting

the propriety of his entering that state, as his penis and testicles very little exceeded in size those of a youth of eight years of age. He was then six-and-twenty; but never had felt the desire for sexual intercourse until he became acquainted with his intended wife; since that period he had experienced repeated erections, attended with nocturnal emissions; he married, became the father of a family, and these parts, which at six-and-twenty years of age were so much smaller than usual, at twenty-eight had increased nearly to the usual size of those of an adult man."* But excessive size, more particularly excess in length, may be considered as a relative cause of impotence, from the contusion and laceration inflicted on the female at each attempt at intercourse. Such cases as these are very rare. P. Zacchias cites an instance in which the female was always thrown into syncope from this cause.

The orifice of the urethra is occasionally formed in an irregular manner, and this constitutes the most common malformation of the penis. It sometimes opens in the perineum, sometimes on the dorsum of the penis, constituting the malformation termed *epispadias*; but most frequently in the under surface of the penis; this defect is called *hypospadias*. This malformation was considered by Mahon, P. Zacchias, Faselius, and Haller, as an absolute cause of sterility, but certainly without sufficient foundation; for there are numerous instances recorded in which impregnation has been effected by individuals in whom the urethra opened in an unusual manner, provided the orifice was in that portion of the penis that entered the vagina. Kopp relates the case of a peasant at Hanau, in whom the urethra opened on the under surface of the penis at the distance of eleven lines and a half from the extremity of the glans, notwithstanding which he was the father of five children.‡ Simeons of Offenbach gives eight cases of *hypospadias*. The first and second were married and had children; the first six, and the second four. The third and fourth were brothers; the fifth and sixth were sons of the first; the seventh was remarkable as having had an action for a divorce against him, and the eighth was an infant.† Foderé quotes four cases of *hypospadias*, in all of which the power of impregnating was preserved;§ and Belloc states that he knew at Agen a man who had the orifice of the urethra at the base of the frenum of the glans, and who left four children perfectly resembling himself, two of whom had the same malformation.|| From the cases on record in which impregnation has taken place without the possibility of intromission, it is clear that the emissio seminis in any portion of the vagina is sufficient for this purpose, and that it is not necessary that this fluid should be carried to the uterus, or to any great distance.

* Lectures on the genital organs.

† Annales de Méd. Politique, t. iii.

‡ Dict. des Sciences Méd. t. 24.

§ Méd. Lég., tom. i. p. 367.

|| Cours de Méd. Légale, p. 129.

* Méd. Lég. tom. 1, p. 370.

† Mahon, Méd. Lég., tom. 1.

‡ 6th Satire.

within the vagina. We shall have occasion to revert to these cases in speaking of female impotence, but at present we mention them as affording an explanation of the subject before us. It may, therefore, be assumed that malposition of the orifice of the urethra does not necessarily constitute a cause of impotence, unless the opening be situated in a part that cannot enter the vagina. Even in the latter case impregnation may be effected by artificial means. The experiments of Spallanzani,* who succeeded in his attempt to impregnate animals by injecting semen into the uterus, led Mr. Hunter to adopt the same course in the case of a man by whom he was consulted in consequence of malformation of the urethra.† The orifice of the canal was in the perineum, through which the semen escaped during coition; and Mr. Hunter directed him to collect this fluid in a syringe and instantly to inject it into the vagina. The experiment succeeded, impregnation took place, and the female was delivered of a child in nine months.

A contracted state of the prepuce, by which the emission of the seminal fluid is impeded, may be a cause of impotence, but this is easily removed by operation. A more serious case is that in which the prepuce adheres to the glans, and the orifice of the urethra itself is contracted. The writer has at present under his care a boy, eleven years of age, in whom a malformation of this kind exists. The reflected portion of the prepuce adheres universally to the glans, and is firmly attached to the orifice of the urethra, which opening is so contracted as scarcely to permit the passage of an eye-probe. The urine is, of course, voided in drops. If this case be permitted to go on to puberty without relief, there is strong reason to imagine that impotence would be the result.

Malformation of the excretory ducts of the testicle may also prove a source of impotence. Mr. Hunter‡ represents a case in which the epididymis, instead of passing to a vas deferens, terminated in a cul-de-sac. A similar conformation sometimes occurs in the vesiculæ seminales, where, instead of entering the urethra, they terminate, after being joined by the vasa deferentia, in shut sacs. It is evident that when such a disposition of parts exists on both sides, the semen, although secreted, cannot be ejaculated, and, therefore, the individual is rendered absolutely impotent.

(c.) *Diseases.*—The diseases of the genital organs which cause impotence, may be divided into those affecting the penis, and those affecting the testicles. Of the former may be enumerated excess or defect of muscular or nervous energy, inducing priapism, or paralysis. Priapism gives rise to a temporary impotence when the erection is so vigorous as to close the urethra in such a manner that the semen cannot pass into it. Defect of energy in the vessels, nerves, or muscles of the genital organs, some-

times prevents the influx of blood to the corpora cavernosa in a quantity sufficient to cause erection, which produces a state of atony approaching to paralysis, constituting the anaphrodisia paralytica of Dr. Cullen. This is a disease not unfrequently met with. Instances of it are given by Chaptal, Gessner, Weicard, quoted by Foderé,* and also by Mahon,† in which it was removed by local stimulants.

Strictures in the urethra, when the canal is greatly diminished, may oppose such a barrier to the exit of the semen as to render the individual impotent; but it is extremely difficult to ascertain to what extent a stricture may exist without producing this effect. We know that many persons in whom strictures in this canal are found, do not lose the procreative power, and therefore, unless in extreme cases, where the finest bougies are with difficulty passed, we should be cautious in assuming this as a cause of impotence. The opening of the conjoined ducts of the vesiculæ seminales and vasa deferentia may be closed by scirrhus enlargement of the neck of the bladder, by enlargement of the prostate gland, a scirrhus state of the verumontanum, or by disease of the duct itself. Foderé alludes to the cases of two individuals mentioned in a French Journal,‡ who having full powers of copulation could never expel semen. On examination after death the seminal ducts of one were found filled with matter of stony hardness; and in the other the extremity of these ducts was callous and blocked up. All these causes produce inability for procreation by obstructing the passage of the semen, although this fluid be duly secreted.

But the cause of impotence may lie in the secreting organ itself, the texture of which is so altered by disease as to interrupt the performance of its natural function. Thus scirrhus, cancer, scrofula, when they affect the entire substance of the testicle, produce such an obliteration of its intimate structure that the seminal fluid is no longer formed. The form of disease described by Andral must be considered as belonging to this class: "Un état d'induration grise ou blanche du parenchyme avec disparition des conduits séminifères; le testicule représente alors une masse homogène, dure, où l'on ne trouve plus aucune trace de son organisation primitive."§ But in order to constitute complete impotence, it is necessary that both testicles should be implicated, and that the disease pervade the entire organ; for a small portion of the gland remaining uninjured may be still capable of secreting semen in a quantity sufficient for impregnation. "In the first method adopted in the East for making eunuchs, we are informed that the masculine efficiency was destroyed by bruising the testes, (a method of castration still pursued in some places with regard to animals,) and destroying their functionary powers along with

* Méd. Lég. tom. i. p. 382.

† Méd. Lég. tom. i. p. 58.

‡ Journal de Médecine de Paris, Ann. 1680.

§ Anat. pathol. tom. ii. part xi. p. 669.

* Œuvres de Spallanzani, t. iii, p. 224.

† Trans. Royal Soc. 1799,

‡ Animal Economy, p. 47, plate 5.

their organization. Instances of generating, however, seem to have occurred among eunuchs made in this manner, and are explained on the supposition that part of the testes remaining uninjured was still capable of preparing the necessary secretion, and furnishing it to a certain extent.*

Local injury may be followed by atrophy of the testicle, and it is well known that a state of complete inaction, such as is observed in those who have maintained a strict monastic life, is often attended by a similar result. Elephantiasis is said to cause a wasting of the genitals and a loss of all sexual appetite, but this is denied by other authorities. (See ELEPHANTIASIS.) A species of idiopathic atrophy of the testicles is described by Baron Larrey, which affected many of the French troops on their return from Egypt. In these cases the organs became soft to the touch, and gradually diminished in size without any pain. Foderé mentions that he observed in some young deserters condemned to work at the canal of Arles, that the testicles melted away just as if they had never existed.†

Diseases of the neighbouring parts may also prove a source of impotence by affording obstacles to the venereal congress. These are extraordinary obesity and very large scrotal hernia and hydrocele. Obesity, when extreme, must be considered a disease; of this, Martin, king of Aragon, furnishes a striking example. "He is stated by historians to have been so corpulent that neither mechanical contrivances nor medical treatment could render him any assistance towards the accomplishment of venereal congress."‡ Large scrotal hernia and hydrocele, by distention of the integuments, cause recession of the penis, and render coition impracticable. Besides, these tumours are considered by Foderé to impede the secretion of semen either by causing too great tension of the spermatic vessels, or by so compressing them that their diameter is obliterated. This effect, however, must be of rare occurrence.

2. *Functional*.—One of the most remarkable changes that take place in the transition from youth to manhood is the development of the sexual organs, and the new train of sensations by which it is accompanied. Puberty is the season of life in which the generative function is called into active operation, and unless impaired by excesses or disease, it usually continues in vigour until the sixty-fifth year. "The genital organs, says M. Virey, offer two states during life, in the young and old, which are the frozen zones of existence; the intermediate state is the torrid zone of life. The infant has nothing to give, the old has lost all."§ This doctrine, however, must not be received without limitation; for instances of precocity, as well as of protracted generating power, are not wanting. Dr. Ryan|| cites some examples

of children precociously developed, even before the fourth year; and he alludes to a case of a boy described by M. Virey, who at seven years of age was as fully developed as an adult, and who made the most furious attacks on his female acquaintance, and absolutely deprived one of them of that which she could never regain. Instances of vigorous senectitude are also occasionally met with. Of these the case of the celebrated Thomas Parr is, perhaps, the most striking. He married at the age of one hundred and twenty, and was compelled to do penance for an amour in his hundred and fiftieth year. But looking on these as exceptions to the general rule, it may be said that extreme youth or old age are incompatible with the exercise of the generative function.

There are, moreover, certain states of the body in which, although the genital organs be perfect, impotence may nevertheless exist, in consequence of incapability of erection. This may arise from constitutional frigidity, or what may be termed the apathetic temperament. The offspring of infirm aged persons, of parents too young, or of those worn down by debauchery, often present examples of this condition. The appearance of persons of this temperament is thus described by a French writer:* "The hair is white, fair, and thin, no beard, countenance pale, flesh soft and without hair, voice clear, sharp, and piercing, the eyes sorrowful and dull, the form round, shoulders strait, perspiration acid, testicles small, withered, pendulous, and soft; the spermatic cords small, the scrotum flaccid, the gland of the testicles insensible, no capillary growth on the pubis, a moral apathy, pusillanimity, and fear on the least occasion." Impotence arising from this cause is usually incurable.

A more common source of impotence is a particular weakness of the generative organs arising from too early coition, from abuse of venereal pleasures, or from indulgence in the pernicious crime of masturbation. In persons whose organs are debilitated by these causes, erection does not take place, although the mind be highly excited by lascivious ideas. The erector muscles have lost power from over use, and are to a certain extent paralysed; and if semen escapes, it is clear, serous, without consistence, and consequently deprived of prolific virtue.

Among the causes of general debility capable of producing impotence, have been reckoned defect of nourishment, bad quality of food, and unwholesome regimen. But we would observe that these influences must be exerted to the very extreme before they can produce the effect described, for in this city (Dublin), where misery, poverty, and starvation exist to a degree perhaps unparalleled on the face of the globe, procreation proceeds with extraordinary rapidity; and it has fallen to the writer's lot, through his connexion with the Coombe Lying-in Hospital, to witness the birth of numberless infants whose unfortunate parents had not for years partaken of a wholesome meal.

* Dr. J. G. Smith, *Forensic Medicine*, p. 450.

† *Méd. Lég.* vol. i. p. 369.

‡ *Paris and Fonblanque*, *Med. Jurispr.* vol. i. p. 204.

§ Ryan's *Med. Juris.* p. 124.

|| *Loc. cit.*

* *Dict. des Sciences Méd. art. Impuissance.*

The habitual abuse of spirituous liquors, long watching, excessive evacuations of blood, bile, saliva, or fæces, as they tend materially to depress the powers of the constitution, may prove temporary causes of impotence. To this class Marc* adds the sedative action of opium, hyoscyamus, and tobacco. The influence of the narcotic gases, in consequence of the sedative effects they produce on the sensitive system, sometimes gives rise to a temporary impotence. Of this the following case given by Foderé is a good example. "J'ai traité un homme âgé d'environ quarante ans, qui, ayant échappé à un état apoplectique occasioné par la vapeur du charbon, reste tellement impuissant pendant six mois, qu'il étoit absolument insensible à toutes les caresses que sa femme, qu'il aimoit jusqu'à la jalousie, mettoit en usage pour l'exciter. Il reprit complètement ensuite son état naturel."† Certain substances, as the *nymphæa* or water-lily, nitre, camphor, colchicum, and indeed most of the diuretics, have been supposed to exert directly sedative effects on the generative organs. That this specific action can cause impotence is probably too much to assert, although some writers have done so; but from the beneficial effects we have obtained from the use of nitre and camphor in cases of over-excitement of the generative apparatus, attended with nocturnal emissions, it would appear that these substances are possessed of properties that tend to moderate the venereal appetite. We have heard of a patient rebelling against the continuance of the use of colchicum, in consequence of its impairing his virility. Dr. Paris takes notice of a peculiar species of impotence arising from debility which deserves notice. "It depends," says he, "upon a want of consent between the immediate and secondary organs of generation; thus the penis acts without the testicles, and becomes erected when there is no semen to be evacuated; while the testicles secrete too quickly, and an evacuation takes place without any erection of the penis."‡

We have already alluded to the effects of strict chastity on the testicles. In this state of decay impotence is the final result. There are some diseases which stimulate the generative organs, such as gout, rheumatism, hemorrhoids, calculus in the bladder or kidneys: in the latter disease the constant irritation propagated to the glans penis frequently urges the sufferer to coition even during the most severe pain. But there are others which extinguish venereal desire during their continuance. These are nervous and malignant fevers, which engage the sensorium from their commencement, and are accompanied with general weakness and prostration of excitability; and diseases of the brain and spinal chord, occasioned either by internal or external causes. Hennen§ mentions a case of a soldier who was rendered im-

potent by a blow on the occiput. With reference to the effect of diseases on the generative function, Foderé mentions a circumstance worth being remembered, which is, that it is possible that certain diseases may produce such an alteration in the constitution, that an impotent man may find himself cured of his impotency on their cessation. He adduces the instance of Avenyoes, who stated he had been without offspring during the whole of his youth, but became a father on recovering from a severe fever. Zacchias states a similar instance. An artisan lived twenty-four years with his wife without having children, when he was attacked by an acute disease, from which he recovered; the fruit of his convalescence was the birth of a son, after which he had many children. It is well known that persons recovering from acute diseases are often extremely salacious. Dr. Dunlop* gives an instance of this on the authority of a friend who visited the hospitals in New York, and who stated that patients recovering after the yellow fever exhibited most furious sexual passion, to the great inconvenience of the nurses and their assistants.

3. *Moral.*—We have already treated of those causes which produce permanent impotence, and of those disturbances of the constitution which during their continuance suspend the generative function: we have now to observe upon those causes which in a sound constitution, with perfect genital organs, are capable of suspending their action, but the cessation of which leaves them free to fulfil their office. These are strong mental emotions, such as too ardent desire, fear of not being loved or of being incapable, shame, timidity, surprise, jealousy, hatred, disgust, in short any thing by which the mind is forcibly arrested. A temporary impotence from this class of causes is by no means a rare occurrence. Of all the causes just mentioned, the fear of incompetence is most frequently productive of impotence. It was a knowledge of this fact that led Hunter to adopt the remarkable mode of treatment which proved so successful in a case of impotence. He prevailed on the person to promise on his honour to pass six nights in bed with a young woman without attempting sexual intercourse, and before the allotted time had expired, the patient's only fear was lest the force of desire should induce him to break his promise. Similar instances have occurred to most medical men, and have been cured by the same means. The facility with which the most vigorous man is rendered impotent by this cause, led to the supposition that supernatural agents were concerned in effecting it, and the natural credulity of mankind soon confirmed the idea. This belief in the powers of enchantment, or, as the French term it, "nouer l'aiguillette," has prevailed in most ages and countries. We have accounts of it in the East, in Egypt, among the Greeks and Romans; and even some of the early fathers of the church, St. Jerome and St. Augustin, are

* Dict. des Sciences Méd. art. *Impuissance*.

† Méd. Lég. tom. i. p. 382.

‡ Med. Jur. vol. i. p. 208.

§ Military Surgery.

* Beck's Med. Jur. by Dunlop.

said to have been imbued with it. Like other forms of enchantment, persons were found who made it their business to practise it, and even princes were subject to their dominion. Nero and Amasis were, at the suggestion of their concubines, rendered impotent by incantation. In this process there was always something to arrest the imagination; some drug was administered, some obscure and unintelligible words were pronounced, or written on paper with blood, and tied about the victim's neck; a lock of his hair was tied, with certain mysterious ceremonies, or some other equally absurd practice pursued, no matter what, so that the proper impression was made upon the mind, and as long as this continued, it had the power of preventing erection by the very fear of failure. The progress of knowledge has done for this species of witchcraft what it has for others, and it is now confined to the lowest and most ignorant people.

II. *Impotence and sterility in the female.*—

It is necessary to distinguish between these two conditions in the female, as it is quite possible for a woman to be impotent and not sterile, and sterile but not impotent; in other words, there may exist a malformation of the genital organs of such a nature as to prevent intercourse, on the removal of which she becomes fruitful; and, on the other hand, she may be perfectly competent to copulation, yet never conceive. The latter is by much the most common, and is believed to occur more frequently in the female than impotence does in the male. Strictly speaking, impotence can only be said to exist in the female when the vagina is incapable of admitting the penis. By this incapacity, however, sterility is not always insured, as it will appear from cases to be presently alluded to, that impregnation has taken place when intromission was impossible. But laying aside these instances, as exceptions, it may be stated generally that an impervious vagina is attended with impotence. Such a condition of the female organs may be the result of various causes existing either in the hard or soft parts. It is rare to find the impediment originating in the former, but Foderé alludes to a malformation of the pelvis, such as considerable depression of the pubis, or exostosis, as capable of opposing the act of generation: we cannot, however, believe that deformity of the pelvis caused by approximation of the pubis and sacrum can offer such a barrier as he supposes; and we are strengthened in our disbelief by the many instances recorded, in which impregnation took place notwithstanding the highest degree of deformity. But an exostosis, when it attains a great magnitude, may very well prove an obstacle to coition. The cause of impotence is more frequently found in the soft parts, and this may be either absence or occlusion of the vagina. Cases in which the vagina was altogether wanting are not numerous, but there are some recorded, and of these one of the most remarkable is detailed in the *Causes Célèbres*.* We will not

give the case at length, but the leading facts were the following. A young woman in Paris was married in her twenty-fifth year to a young man named La Hure. Six years were passed without consummation of the marriage; and then the woman was examined by a midwife, who declared all the external organs of generation wanting, and their place occupied by a solid body pierced by a small hole. The woman admitted that she had never menstruated; nevertheless she had always enjoyed good health. A surgeon, named Dejours, who saw the case at this time, supposing it one of simple occlusion of the vagina, proposed to divide the barrier, in hopes of reaching and laying open the cavity. He accordingly carried a scalpel to the depth of two fingers' breadth, but instead of reaching a vagina, he was still opposed by solid resisting parts. Finding this, he judged that he had nothing to hope for in going further, and that he should run great risk of wounding the bladder or rectum. He therefore endeavoured to keep open the wound he had made by the introduction of tents, and this opening remained during life. Matters continued quiet for eight years more, when the husband, disgusted with his wife, demanded a divorce. The woman died at Lyons ten years afterwards, and on examination it was found that the place of the vagina and uterus was occupied by a hard compact substance, in which no cavity could be traced. Not long ago a case somewhat similar was exhibited to the Society of the Faculty in Paris, in which no uterus or vagina existed, and the perineum was pierced by a small hole, which was the termination of the urethra.

A more common case is that in which the calibre of the vagina is so diminished as to resist the intromission of the penis. Several instances of this malformation are to be found in writers on legal medicine and midwifery, one of which we may mention, as it affords a striking example of the manner in which nature accommodates parts to the offices they are called on to perform. A young girl, married at the age of sixteen, had the vagina so narrow, that a goose-quill could scarcely enter it. A young and vigorous husband had failed in all his attempts, and some of the faculty who were consulted declared copulation impracticable. Nevertheless, after eleven years this woman became pregnant without any increase in the dimensions of the vagina. Her friends of course despaired of the possibility of delivery; but about the fifth month of pregnancy the vagina began to dilate, and at the full time it had acquired a size sufficient to permit the passage of the infant.* In the celebrated Joan of Arc, the Maid of Orleans, according to the account of two physicians who were ordered to examine her, the vagina was found so contracted that coition must have been impracticable. Malformation of this kind is frequently removable by appropriate treatment. In a case that occurred to Benevoli, he employed emollient fomentations and tents, and

* Tom. vii. and x., *Vingtième cause*.

* *Mém. de l'Acad. des Sciences de Paris*. 1712.

by gradually increasing the size of the latter, succeeded in removing the imperfection.

In those cases in which the uterus is divided longitudinally into two chambers, it sometimes happens that the septum is prolonged into the vagina, even to the vulva.* In this condition of parts, if the intervening membrane be firm and rigid, it may oppose a barrier to coition. The vagina may be also too short and terminate abruptly in a cul de sac; this disposition of parts may be congenital, but it may be also the result of difficult labour. When congenital, it is usually attended by absence of the uterus.

The inflammation that sometimes follows difficult labours (particularly if instruments have been incautiously used) has been known to cause adhesion of the sides of the vagina, and so cut off all communication with the uterus. The writer is acquainted with a very remarkable instance of this accident at present in the Coombe Lying-in Hospital, Dublin. The sufferer is a young healthy woman, in whom there is a fistulous opening between the bladder and vagina, and just beyond the opening the sides of the vagina adhere firmly. She applied at the hospital in hopes of obtaining some relief from her miserable state, which she said was the consequence of a tedious labour, during which instruments of some sort were employed. It is remarkable in this case, that although the outlet for the menstrual discharge is closed, there is no indication that it is poured out by the uterus, for none of the signs of confined menses are present. We are therefore inclined to suppose that the cavity of the uterus itself has been obliterated by the inflammation, and consequently that an operation would not be attended with success.

The vagina is frequently found closed at its orifice: this may be caused in different ways. It is sometimes produced by neglected inflammation and excoriation of the labia in children, and even in adults; and this has extended in some cases to a complete closure of the canal, so that no passage has remained but a small one at the superior anterior part for the discharge of urine. Dr. Ryan† states that he has seen four cases of cohesion of the labia externa at the age of puberty, so complete that only a small probe could be introduced at the superior commissure. Dr. Meriman once met with an instance where the entire opening of the labia was so perfectly closed, in an infant of two years old, that there was not the smallest aperture through which the urine could escape.‡ We find in the works of Ambrose Paré, Ruysch, Fabricius Hildanus, Benevoli, and others, examples of complete obstruction of the vagina, either at its orifice or at a greater or less depth, by a membrane of such strength as to resist intromission. Dr. Meriman§ relates the case of a young woman whom he was called to at-

tend in her first accouchement, and on proceeding to make an examination he found it impossible to introduce his finger into the vagina, that passage being closed by a membranous expansion about one-tenth of an inch in thickness. This membrane occupied the entire opening of the vagina, with the exception of a small aperture through which a pea could hardly have passed. It was finally ruptured by the child's head, and delivery was safely accomplished. The same author gives another case related by Dr. Tucker, in which the obstruction was even more complete. "The labia pudendi were observed to have the usual situation and appearance; but being expanded, they were discovered to be connected to each other by a strong opaque membrane, nearly a finger's breadth, not distinguishable from their external skin in texture and appearance, which was stretched from the surface of the perineum (of whose outward skin it seemed likewise a continuation or production) over the longitudinal sulcus between the labia, and over the clitoris, quite to the pubis. About the middle of this membrane there was a circular aperture, with a strong ring, just large enough to admit a female catheter one-eighth of an inch in diameter." In this case the membrane was so strong that it resisted the forcible impulse of the child's head during several pains, and was at last divided artificially from the aperture to the frenum labiorum. These and many similar instances on record are the cases to which we referred in speaking of hypospadias, as confirmatory of the doctrine laid down there, viz., that an emissio seminis at the orifice of the vagina is sufficient for impregnation, and they afford instances of what may be considered paradoxical, that is, of women being impotent, yet conceiving. The following case from Foderé is so striking that we cannot omit to mention it. A young man had married a young woman, with whom, although he had frequently made the attempt, he could never consummate the marriage, "*à son gré.*" At the end of three months he demanded a divorce, although she declared herself pregnant. She was now examined by many skilful surgeons, who found a hard callous membrane placed at the mouth of the vagina; this they divided, and the operation succeeded so well that the husband relinquished his claim for divorce. The woman was delivered, in six months after the operation, of a male infant at the full term, and of great vigour. From these cases it is plain that this hypertrophied state of the hymen, although it affords a barrier to copulation, is yet capable of removal by operation, and therefore it cannot be considered as a permanent cause of impotence.

Narrowness of the mouth of the vagina is sometimes accompanied with a communication between that canal and the bladder or rectum. Foderé states two cases of this description, in both of which sterility prevailed. Procidencia of the uterus might be supposed to create impotence, were it not that some very remark-

* Andral.

† Manual of Med. Jurisprudence, p. 129.

‡ On Difficult Parturition, 3d edit., p. 221.

§ Loc. cit., p. 216.

able instances of the contrary are recorded. In the fourth volume of the London Medical and Surgical Journal, may be found a description of two cases of this disease, in both of which impregnation took place, although the natural orifice had been fixed without the vulva for years.

We now come to speak of sterility, or of those cases in which, the vagina being pervious, impregnation does not occur. This may depend upon imperfect development or total absence of the uterus, obliteration of its openings, diseases of this organ, obstruction or disease of the fallopian tubes, and absence or disease of the ovaria. That form of imperfection in the uterus in which one-half of the organ is wanting, and which case is attended with but one ovarium and one fallopian tube, does not entail sterility. Chaussier relates a case of this kind in which several children were born at the full time.* But there is a variety sometimes found which must render the woman barren; in which the uterus is so small that it is with difficulty found in the pelvis, and the fallopian tubes appear to terminate in the extremity of the vagina. We have already said that unnatural shortness of the vagina is frequently connected with absence of the uterus. Columbus dissected a woman who had always complained of great pain in coitu, in whom he found the vagina very short, and no uterus at its termination. A similar case occurred to Dupuytren: † the vagina was only one inch in length, the ovaria and fallopian tubes were well developed, but no uterus existed. Foderé states that this malformation may be discovered during life by the smallness of the breasts, &c.; but in the case mentioned by Dupuytren the breasts were well formed, the external genitals developed, and the whole appearance was feminine. It is plain that sterility must attend this defect.

The different orifices of the uterus may be obliterated, and thus impregnation will be prevented. The opening of the fallopian tubes has been found closed; and this may be owing to a simple continuation of the lining membrane of the uterus over it, or to the existence of a particular membrane blocking up the mouth of these tubes, or to an obliteration of the tube itself, which sometimes extends to the distance of some lines from the uterus. When both tubes are thus circumstanced, no uterogestation can go forward, for obvious reasons. But the mouth of the uterus itself is occasionally obstructed either by an adventitious membrane stretched across, or by an agglutination of its sides; and when this is the case, sterility is the result.

Besides the closing of the uterine extremity of the fallopian tubes, these canals are sometimes impervious throughout their whole extent; sometimes the obstruction is situated about the middle, and at others the fimbriated extremities alone are blocked up; and this

latter is frequently caused by an intimate adhesion between them and the ovaria.*

The ovaria are sometimes wanting. This deficiency may exist at but one side, a specimen of which is preserved in Dr. Hunter's museum; and Dr. Baillie takes notice of others in which these organs were deficient on both sides. Dr. Denman says he was shewn two preparations by Dr. R. Hooper, in which the fallopian tubes terminated bluntly, and without any aperture, fimbriae, or ovaria.†

Besides these impediments to impregnation, there are certain diseases of the female genital organs, which, when they exist, are found to cause sterility. Polypus in utero is very generally considered to belong to this class; but although the opinion is generally correct, it is not universally true, for it has happened that conception took place notwithstanding the presence of a very large tumour in the uterus. Of this the late Dr. Beatty‡ has described a very remarkable instance, which occurred in Dublin in the year 1820. The patient was a lady twenty-five years old, who, in consequence of the indisposition of her husband, had left his bed in May 1819, to which she did not return until August 1820. In the previous May she first perceived what she termed a "lump in her womb," attended with external swelling and soreness on pressure at the lower part of the abdomen. This swelling was not permanent, but was observed to disappear during the menstrual period. Finding an increase in her unpleasant symptoms, she applied to Dr. Beatty in September, and on the 28th of that month he made an examination per vaginam. The os uteri was found dilated to the size of a dollar, and in its opening was a large dense substance with a regular smooth surface. On the 10th of November, while out in her carriage, she had a moderate discharge of blood from the vagina, and upon examination the parts were found as they were a month before. At two o'clock the following morning she miscarried, the embryo was entire, the membranes not being ruptured: the contained fœtus was about three months' old—a period corresponding with the time at which connubial intercourse had been resumed, and at which she had last menstruated; and just three months after she first experienced uterine uneasiness. The tumour was expelled in six days afterwards by pains resembling labour, the uterus was inverted by its descent, but on separation of the slight attachment between it and the tumour it was easily reduced. The weight of the tumour was found to be nearly four pounds. This lady was delivered of a healthy boy on the 10th of February, 1822. This was an instance of pregnancy occurring during the existence of a tumour of considerable magnitude in the uterus; but we believe it to be an exception to what usually takes place.

Inflammation, suppuration, calculous depo-

* Morgagni. Baillie. Richerand. Andral.

† Denman's Midwifery, 6th edit. p. 42.

‡ Trans. of the Association of Coll. of Phys. in Ireland, vol. 4.

* Andral.

† Répertoire d'Anat. Pathol. t. v. p. 99.

sitions, cancer, cauliflower excrescence, corroding ulcer, the irritable uterus of Dr. Gooch, and any disease in which the texture of the uterus is much engaged, or with which the constitution sympathizes strongly, are so many obstacles to impregnation, as are diseases of the ovaria, in which the natural structure of these organs is obliterated, and both of them engaged. Leucorrhœa, when profuse, is very often also attended by barrenness; but this is by no means a constant effect, as we have known instances in which this disease existed to a great extent without preventing impregnation.

A question has arisen whether menstruation is necessary in order that a woman shall be prolific; and it generally stated that women who do not menstruate cannot conceive.* This is true when applied to those who have never menstruated, but is not in cases that have had even a single monthly discharge. Foderé† states that, in the first edition of his work, he had maintained that females who do not menstruate are sterile; but he afterwards was obliged to change his opinion, from having observed some patients under his own care enjoying good health without this evacuation, and bearing many children. One of them was a woman thirty-five years old, the mother of five children, the last of which she was suckling. She was in good robust health, and had never menstruated but once at the age of seventeen years. It would appear that a single occurrence of this periodical evacuation is a sufficient indication of generative power; and although irregularity in subsequent years is frequently attended by sterility, it is not to be taken as an absolute cause of it. There is a form of dysmenorrhœa described by Dr. Denman‡ and Dr. Dewees§ of Philadelphia, which both these authors state to be productive of barrenness. The striking peculiarity in this disease is the formation of an adventitious membrane in the uterus, which is expelled after severe and protracted suffering at each menstrual period. This membrane is sometimes thrown off in pieces, and at others entire, at which time it bears the strongest resemblance to the decidua, so much so that, when it occurs in unmarried females, it may and sometimes does give rise to most painful suspicions. There is a preparation in the museum of the College of Surgeons, Dublin, of an entire membrane of this kind, which might deceive the most experienced eye. Morgagni relates a very remarkable instance in which pregnancy occurred during the existence of the habit just described, but it is probable that there was a suspension of the disease for a time in that case, when the capability of conceiving might exist.

It is well known that instances have happened in which persons have lived for years in unfruitful matrimony, and being after divorce remarried, have both had children. This is a fact which in the present state of our knowledge

we are not able satisfactorily to explain, and we will not delay the reader by offering any speculative opinion upon it.

Treatment.—The treatment of impotence and sterility must be influenced by the causes from which they spring, some of which are incurable, whilst others may be removed by appropriate remedies. Those cases which depend upon congenital deficiency of the penis, testicles, vagina, uterus, fallopian tubes, or ovaria, belong to the former; but we have seen that some of those arising from malformation and disease of these parts are susceptible of cure. Such are phymosis, adhesion of the prepuce to the glans with diminution of the orifice of the urethra, priapism, partial paralysis, strictures in the urethra, diseases of the neighbouring parts, contracted vagina, occlusion of the mouth of this canal by adhesion of the labia, or by a dense hymen, prolapsus and procidentia uteri, polypus in utero, leucorrhœa, dysmenorrhœa: all these are more or less capable of removal either by operation or general treatment. The cases of impotence which depend upon functional or moral causes are much more numerous than those just mentioned, and frequently become the subjects of medical treatment. If old age be the cause, there is little to be done; medicines are useless, and temporary stimulants are often worse. There have been instances of old debauchees, who, wishing to make a last attempt, have taken some of the nostrums, such as the Venetian pastilles, Italian lozenges, &c. and have perished without success in the very effort. Cases arising from debility of the generative organs, from too early coition or the abuse of venereal pleasures, are not unfrequently met with, and indeed furnish the great mass of dupes to quackery. In the treatment of such cases there are many points that must be strictly attended to. We must be careful to remove from the imagination, or regimen, all that may excite the generative apparatus, while we endeavour to strengthen the system by mild nourishing diet and gentle tonics. We must combat on the one hand muscular weakness, and on the other nervous susceptibility, and so restore the equilibrium between the two systems. The local application of cold water has a great effect in allaying the excitable state of the generative organs, and should be had recourse to at least twice a day. If the impotence be owing to moral or physical irritation, the constitution must be lowered by spare diet, cooling acidulated drinks, exercise in the open air, and removal from all objects which excite venereal desires. This plan of treatment we think preferable to the employment of narcotics, which sometimes produce unpleasant effects, and are always hurtful to the digestive organs. In those cases which are purely the effect of atony of the generative organs, and do not arise from their over-excitement, a different line of conduct must be pursued. The diet should be full and generous, with a liberal allowance of spices and wine; and the exclusion of all objects of a nature to excite the senses need not here to be recommended. Frictions to the

* *Paris and Fonblanque, Med. Jur.* vol. i. p. 214.

† *Méd. Légale*, vol. i. p. 397, ed. 2me.

‡ *Denman's Midwifery*, 6th edit. p. 90.

§ *Dewees' Midwifery*, p. 154.

loins, and the cold bath, will be found useful; sometimes it will be necessary to substitute the warm bath when the cold does not produce the healthy reaction we desire. (See BATHING.) If these means fail, we may then have recourse to stimulating applications to the loins, thighs, and pubis, and electricity may be used with advantage. (See ELECTRICITY.) In the year 1776 Dr. Graham opened an establishment in London, in which were a number of electrical beds, destined to awaken the dormant generative powers in cases such as we have described.

Modern systematic writers have discarded that class of medicines formerly grouped together under the name of aphrodisiacs, from their supposed power of exciting a desire for venery: it consisted of stomachics, aromatics, odoriferous gums, balsams, resins, essential and volatile oils, perfumes, particularly musk, phosphorus, opium and aromatics combined, and cantharides. These, with the exception perhaps of cantharides, seem to act only as general stimulants, and do not possess any specific powers over the organs of generation. Cantharides, as is well known, when administered in large doses, are sometimes capable of inducing a violent state of irritation of the urinary and genital organs, indicated by strangury, bloody urine, priapism, &c.; but this condition can never be induced without other violent constitutional symptoms being also brought on, to the great hazard of life;* and we are much inclined to doubt that a person labouring under these effects is disposed to venereal enjoyments. However, cantharides have been for a long time employed as an aphrodisiac, and for this purpose they entered into the composition of many secret remedies, such as the Venetian pastilles, Italian lozenges, love potions of Italy and Turkey, &c. to the use of which we believe many have fallen victims. The "remède de magnanimité" of Kœmpfer, so called after its inventor, is composed of opium, musk, and ambergris, and is extensively employed in the East, where it is taken daily by the great for the purpose of exciting venereal desires.

From what has been said in commenting upon the different causes of impotence, it is unnecessary to prolong this article by any further notice of their medico-legal application; we will therefore conclude by deducing, in the words of Dr. Ryan, from the preceding statements, the following general principles:—

"1. To declare either sex impotent, it is necessary that certain physical causes be permanent, malformations or accidental lesions, and be evident to our senses, which art cannot remedy, and which prevent the faculty of exercising a fecundating coition.

"2. These causes, when rigorously examined, are few in number.

"3. The moral causes of impotence ought not to be taken into consideration, as they would serve for an excuse for an individual accused of impotence."†

(Thomas Edward Beatty.)

INCONTINENCE OF URINE. ENURESIS.

RESIS, from *ἐνυγγία*.

History of the disease.—In man the excrementitious secretions, although taking place continually, are discharged from the body only at intervals; and some of them have appropriate reservoirs for their reception. To this law there are two exceptions, the cutaneous perspiration and the exhalation from the lungs. The saliva, the schneiderian mucus, and the tears may be considered as finding their way, in part at least, down the gullet, and are retained in the body by the sphincter of the alimentary canal. The urinary bladder constitutes an important reservoir of this nature, which by the due performance of its retentive function, saves us from a very loathsome and painful infirmity, named *incontinence of urine*. In every case where the urine, though but a small quantity be collected in the bladder, is forced off without the voluntary effort of the individual, or flows from him unconsciously, he is truly said to labour under incontinence of it, or *enuresis*. The urine thus constantly escaping from the bladder, soon produces in the surfaces with which it comes in contact, redness, minute vesicles, pustules, excoriations, and at length ulcerations. The patient's clothes, being kept moistened with the same fluid, exhale an offensive ammoniacal odour; and thus he is not only subjected to the distressing itching and pain of the excoriations, but becomes an insupportable annoyance to those around him. The urine being decomposed by exposure to the air, the phosphates are formed and deposited in the surface over which it flows, and hence we have often in cases of enuresis small particles and thin crusts of gravelly substance, which serve to increase the irritation of the excoriated parts.

Incontinence of urine exists in different degrees, being in some cases so complete that the fluid drains off continually by the mere effect of gravity, as if the bladder and urethra were without life; in others it is discharged at short intervals in small quantities, by the involuntary contraction of the bladder; or this occurs only during sleep; or the urine is retained by the patient while at rest, but when he moves about, it flows off, notwithstanding all his efforts to retain it. Sometimes the degree of exercise required to produce incontinence of urine is considerable, as in the instance of a woman cured of vesico-vaginal fistula, who was a servant in a small tavern: she could retain her urine perfectly excepting on market-days, when she was subjected to much fatigue, running up and down stairs.*

Causes.—The immediate cause of enuresis is in all cases a greater or less defect in the muscular fibres which close the external orifice of the bladder, and to which the name of sphincter may with perfect propriety be applied.† This defect in the muscle which op-

* Edin. Med. and Surg. Journal, vol. xxi. p. 62.

† See Treatise on the Urethra, &c. by Sir Charles Bell, for the true anatomy of the sphincter of the bladder.

* Christison on Poisons, p. 456.

† Ryan's Med. Jur. p. 133.

poses the escape of the urine may be either positive or relative. Positive defect in the sphincter may consist in a debilitated or paralysed state, or in its inefficiency from an aperture existing in some part of the bladder. Relative defect in the sphincter, on the other hand, consists in its inadequacy to resist the strong and sudden contractions of the expulser of the urine, which thus overcomes the closing muscle, and reduces matters to the same state as if the sphincter were actually debilitated. But we are inclined to think, that in most of those cases where the body of the bladder is morbidly irritable and prone to contract on a slight stimulus being applied, the sphincter is in like manner prone to dilate and to yield to the pressure of the urine, which indeed is quite in accordance with the natural sympathy of the parts.

Paralysis of the sphincter of the bladder arises from the various diseases and injuries of the brain and spinal chord which give origin to other palsies; and it is occasioned likewise by injury or disorganization of the nerves which immediately supply the neck of the bladder. A state of debility, or an approach to paralysis of this part, may arise from injuries inflicted upon itself or its immediate vicinity: such as the operation of lithotomy, the dilatation of the part in the extraction of calculi without incision, repeated laborious parturition, suppurations in the vicinity of the neck of the bladder, the operation for fistula in ano, injury of the bladder by its displacement, as in cystocele, prolapsus of the uterus and rectum, pressure from the gravid uterus. Many females in the latter stages of pregnancy cannot cough or laugh loudly, or make any sudden movement without causing the involuntary discharge of a small quantity of urine. The sphincter of the bladder may also be so weakened as to produce enuresis, by a long continuance in the cold-bath, by habits of immoderate indulgence in sexual intercourse, and by solitary vice; the first of these causes acting as a direct sedative; the two last as indirect ones, by inducing at intervals excessive and prolonged turgescence of the genital organs, and consequent debility.

The retaining power of the sphincter of the bladder is completely destroyed by the formation of an aperture in that organ in or beyond its neck; as in vesico-vaginal fistula, in fistulous openings between the bladder and rectum, or between the bladder and the external surface of the abdomen, and in fistula communicating with the ureters or kidneys. The same will be the effect in all those cases of deficient congenital formation where the cavity of the bladder communicates directly with the surface of the body,* and where the urachus remains open with an orifice at the umbilicus, or has become so in the progress of disease.

Instances of the relatively deficient power

of the sphincter of the bladder are presented by most of those cases of nocturnal emission of urine which are met with in children; and the same morbid sensibility of the bladder occurs also in old men, and is productive of the same consequence—enuresis.

The irritability of the bladder may be augmented by many causes, of which the most frequent are calculus and disease of the prostate gland; fungous growths within the bladder have also the same effect; and it is produced likewise by the presence of worms within the rectum, and by other irritations of neighbouring parts. Enuresis depending on a convulsive contraction of the muscular tissue of the bladder takes place during the paroxysm of epilepsy, and, in a less severe degree, occasionally in chorea and hysteria; also from the sudden impression of cold in the genitals, and from the influence of sharp unexpected pain. It is told of an Italian coachman that, when he wished his horses to stale, he seized their ears between his teeth and bit them smartly, which never failed to produce a flow of urine. The effect of piercing sounds, as the notes of the Scotch bagpipe, in causing involuntary contraction of the urinary bladder, has often been remarked; and common observation must convince us how powerfully this organ is influenced by fear and anxiety of mind.

Enuresis in children usually ceases after the second dentition, and very rarely persists beyond the full development of the genital organs at puberty; except, indeed, in cases of mental imbecility, where its continuance is to be referred to the same cause which produces the inability to retain the saliva, and the tottering step and awkward movements of the idiot.

Incomplete enuresis may also be produced by a diminution of the cavity of the bladder, which renders it impossible for the person to retain more than a very small quantity of urine; and in such cases there usually exists at the same time a morbid irritability of the body of the organ.

Treatment.—In enuresis, as in most other symptoms of disease, the mode of treatment will depend on the cause of the affection; and by its removal we shall in general accomplish a cure. When the power of the sphincter of the bladder is positively weakened, we must employ the most approved means of restoring the nervous energy of the part, as friction, rubefacients to the loins and sacrum, the affusion of cold water on the spine, blisters to the lumbar and sacral regions, electricity, galvanism, stimulating enemata; the internal use of cantharides, strychnine, tonics, such as quinia, nitrate of silver, arsenic, steel, copper, zinc, and the vegetable bitters. When incontinence of urine depends on the existence of a fistulous opening in any of the urinary cavities, the aid of surgery must be called in; but if all attempts at a cure fail, one of the many ingenious mechanical contrivances for such cases must be had recourse to, and the situation of the patient rendered as comfortable as this distressing infirmity will permit. Un-

* *Duncan*, Edinburgh Med. and Surg. Journal, vol. i. *Baillie*, Morbid Anat. *Meckel*, Handbuch der Patholog. Anat. b. i.

der these circumstances the greatest attention must be paid to personal cleanliness; and the ammoniacal smell which is so liable to be produced ought to be corrected by means of one of the vegetable acids, such as the acetic or tartaric. In almost all cases of enuresis from malformation, this palliative plan is the only one which affords any prospect of benefiting the patient.

When enuresis proceeds from a disproportion between the contractile power of the body of the bladder and that of the sphincter, or, in other words, from a morbid sensibility of the bladder to the stimulus of the urine, attention to the general health and to the state of the bowels is especially required. The irritability of this organ must be allayed by large doses of opium and hyoscyamus given in enema or suppository, and, if necessary, by the mouth; and all irritations of neighbouring parts, such as from worms in the rectum, must be removed. As this form of involuntary discharge of the urine occurs most readily during sleep, certain precautions are required before the patient goes to rest.

Nothing of a diuretic nature should be taken at any time of the day, and no liquids swallowed for some hours before bed-time: the patient's bed should consist of a mattress with a moderate covering of bed-clothes, and he should recline on his side and rather on his face, for the contractions of the bladder seem to be excited by the urine resting on the sensitive surface between the orifice of that organ and the openings of the ureters.* Nocturnal enuresis occurs under different circumstances—from the sleep being so profound that the child is not awakened by the stimulus of distention which precedes the expulsion of the urine, or from his dreaming of voiding it, or, lastly, from an indolent disposition, which prevents him from attending to the first call to evacuate the bladder. The importance and necessity of cleanliness must be carefully impressed on the youthful mind; for by mistaken indulgence we may prolong the habits of early infancy into the period of advanced childhood. We are, therefore, clearly of opinion that when the frame is not debilitated, and when the precautions already noticed have been taken, a little wholesome chastisement will in such cases of enuresis be highly proper: it will render the sleep less profound, the dreams less delusively vivid, and serve to dispel the apathy of the indolent and the slothful. But far be it from us to recommend the revival of those punishments invented by the cruel ingenuity of former times, such as causing children subject to this infirmity to crush mice to death in their hands, to submit to the loathsome infliction of having live toads suspended from their necks, and to sit by the bed-sides of the dying. When the habit of nocturnal enuresis is deeply rooted, punishment, even the mildest, cannot be frequently repeated; but an attempt should be made to correct it by calm admonition, and endeavour-

ing to awaken a sense of shame. If increasing years do not bring with them a cure, great benefit will be derived from forcibly confining the urine within the bladder: it will tend at once to interrupt the habit, and to rouse the irritability of the sphincter. Where the jugum penis has failed, a speedy cure has been accomplished by strapping a bougie along the lower surface of the penis, so as to render the canal quite impervious to the urine.*

The urethra of females being short, and the bladder often subjected to great distention, enuresis is with them sometimes very obstinate, and requires for its cure a certain turgescence of the genital organs. Thus, when the disease does not yield to the change produced at the period of puberty, it may be removed by the internal use of cantharides and by marriage. The following fact will serve to illustrate the efficacy of turgescence of parts on the functions of the bladder. A middle-aged female, who had suffered for years from calculus, and was voiding her urine in dribblets every few minutes, had the stone extracted by dilatation, and for a fortnight thereafter retained her urine like one in health; but when the swelling from the operation subsided, incontinence came on, and continued for months to resist the various remedies employed for its cure.

When enuresis in the aged depends on a morbid sensibility of the bladder, we have found great benefit from the use of balsam of copaiba; but in many of these cases the functions of the bladder are disordered by habits of intemperance, which must be corrected before we can expect any remedy to produce permanent relief.

(W. Cumin.)

INCUBUS, (from *incubo*, to lie or sit upon,) *nightmare*: an affection coming on during sleep, and characterized especially by a sense of weight on the chest, with an inability to move, and sometimes even to speak. Various affections attacking a person during sleep produce sensations, often very uneasy, but insufficient to awake him completely; and although his eyes may be open, and he may be conscious of surrounding objects, he labours under the fancies of some horrible dream excited by the sensations in question. It is this state of imperfect possession of the faculties, and the absence of volition, which gives the peculiar character to the disease called incubus, or nightmare; and this circumstance would entitle it to be considered as much a mental as a bodily disorder. The causes of the sensations are, however, physical, and it is against these principally that treatment can be directed.

The usual and severe form is that in which the patient, in the midst of his sleep, generally in the first part of the night, becomes conscious of the sensation of a huge weight on his breast, which oppresses and impedes his breathing. This is accompanied by a feeling

* C. Bell, Treatise on the Urethra, &c.

* *Hyslop*, London Medico-Chir. Trans. vol. vi.

of inability to move, and often to speak, which greatly increases the discomfort; and the fancy, ever active, embodies these phenomena into some monster, overpowering and crushing the body. Hence the superstitious names, *nightmare*, *incubus*, *succubus*, *ephialtes*, &c. In many instances the feeling of weight or pressure is less defined; but there is a sense of general restraint and uneasiness which the mind converts into some imaginary danger, such as falling down a precipice, being pursued by an armed enemy or savage beasts, and the like, with a feeling of weight on the limbs, and an inability to escape; and this becoming so intense as to break the remaining tie of sleep, the person awakes with a start, and under the temporary alarm of this imaginary evil.

Nightmare, in all its varieties is, then, a disorder of the function of sleep, (if by such a name we may designate a suspension of other functions,) and it becomes an interesting matter of further inquiry, inasmuch as it in a degree presents an analysis of the state of sleep itself. The power of volition, both in mind and body, is that which is the most completely suspended in natural sleep. Sometimes the other mental faculties are equally so, but more generally there are trains of thought going on; and simple sensation, although blunted, is never entirely suspended. Dr. Alison has well established the opinion formerly entertained by Whytt, that respiration is an instinctive motion excited by the sensation of black blood in the lungs; and the movements and changes of posture unconsciously effected during sleep, seem to be of the same kind, and scarcely coming under the head of voluntary motions. When sleep is coming on, there is, first, an indisposition to perform voluntary acts, and if no awakening cause be applied, this soon amounts to inability. But the senses may still be awake, and although volition cannot shape or direct them, trains of ideas result from their impressions. When sleep becomes more perfect, however, the senses become more obtuse, and, unless excited by some considerable impression, incapable of influencing the other mental powers that may remain still in activity. Such an impression, when produced, if of the painful kind, and insufficient directly to awake the person, will not fail to excite some or other of the varieties of nightmare. The form which it assumes will depend on the nature of the bodily impression, and it will be sufficient to illustrate the subject by one or two examples.

In the case to which the term *incubus* or *nightmare* is commonly applied, that, namely, of a sense of weight and oppression on the chest, there is, we believe, an imperfect performance of the function of respiration, caused either by a constrained posture or distended stomach; or in some cases it may be by a slight attack of asthma, excited by acid or other crudities in the alimentary canal. Now such slight impediments during our waking hours are easily obviated by the supplementary aid which voluntary efforts can give to the respira-

tory process: we change our posture, draw our breath more deeply, relieve the stomach by eructation, &c.; and all this with scarcely a consciousness of the ailment, or of the act which relieves it. But during sleep these movements are not at our command; the respiratory act is more limited, and although sufficient for the natural state of the function, becomes inadequate when an embarrassment renders necessary an increased exertion or new movement. In event of this, therefore, black blood gradually accumulates in the lungs, with its consequent effects of congestion in the right cavities of the heart, and feeling of oppression and suffocation, which, after tormenting the mind for a time in some demoniacal form, at length reaches such an acme, as to break the spell of sleep, and awake the sufferer to the possession of those voluntary powers, by the exercise of which the bodily function is restored to its natural state. No sooner is he fully awake than the bodily uneasiness is removed, and he is sensible only of the mental disquietude which his frightful dream has occasioned; and this, joined with the excitement of the restored circulation, may prevent him from readily composing himself to rest again. This we conceive to be a sufficient explanation of the phenomenon of nightmare; without resorting to hypothetical notions of pressure on the solar plexus or nerves of the stomach, which, if capable of producing an effect at all, should do so equally beyond the period of sleep. Incubus may, therefore, be justly placed in contrast with somnambulism, in which the power of voluntary motion continues, whilst the external senses are either suspended, or their impressions superseded by some internal train of ideas that engrosses the mind.

As causes of incubus, we have already named disordered digestion and constrained posture; and we may now add diseases of the heart, and whatever is capable of interrupting, during sleep, the due arterialization of the blood.

We pass on to notice some other causes which may produce effects of analogous character. Such are, pains of any kind, as tooth-ach, ear-ach, &c. which, when insufficient to prevent sleep, often become the demon of a dream, tormenting the sufferer in a thousand different shapes. Cold feet are another common cause of disordered sleep. There is, however, between these causes and that which produces nightmare, this difference; that in the case of these, the person awakes to a consciousness of the real cause, whereas the sensation of nightmare ceases with the return of voluntary movement.

Various impressions on the sense of touch may engender disturbances of somewhat similar character. On this subject some remarks by the most celebrated writer of our day are too philosophical to be omitted here. "There is one circumstance in which the sense of touch is very apt to betray its possessor into inaccuracy, in respect to the circumstances which it impresses on its owner. The case occurs during sleep, when the dreamer touches with his

hand some other part of his own person. He is clearly, in this case, both the actor and the patient, both the proprietor of the member touching, and of that which is touched; while, to increase the complication, the hand is both toucher of the limb on which it rests, and receives an impression of touch from it; and the same is the case with the limb, which at one and the same time receives an impression from the hand, and conveys to the mind a report respecting the size, substance, and the like, of the member touching. Now, as during sleep the patient is unconscious that both limbs are his own identical property, his mind is apt to be much disturbed by the complication of sensations arising from two parts of his person being at once acted upon, and from their reciprocal reaction; and false impressions are thus received, which, accurately inquired into, would afford a clue to many puzzling phenomena in the theory of dreams. This peculiarity of the organ of touch, as also that it is confined to no particular organ, but is diffused over the whole person of the man, is noticed by Lucretius:—

‘ Ut si forte manu quam vis jam corporis ipse
‘ Tute tibi partem ferias, æque experiare.’

A remarkable instance of such an illusion was told me by a late nobleman. He had fallen asleep, with some uneasy feelings arising from indigestion. They operated in their usual course of visionary terrors. At length they were all summed up in the apprehension that the phantom of a dead man held the sleeper by the wrist and endeavoured to drag him out of bed. He awoke in horror, and still felt the cold dead grasp of a corpse's hand on his right wrist. It was a minute before he discovered that his own left hand was in a state of numbness, and with it he had accidentally encircled his right arm.*

Another case, which Dr. Abercrombie in his interesting work “On the Intellectual Powers,” cites from the late Dr. Gregory, is clearly one of the same character with nightmare, and well illustrates our explanation of its pathology. “Dr. Gregory mentions a gentleman, who, after sleeping in a damp place, was for a long time liable to a feeling of suffocation whenever he slept in a lying posture; and this was accompanied by a dream of a skeleton which grasped him violently by the throat. He could sleep in a sitting posture without any uneasy feeling; and after trying various expedients, he at last had a sentinel placed beside him, with orders to awake him whenever he sank down. On one occasion, he was attacked by the skeleton, and a severe and long struggle ensued before he awoke. On finding fault with his attendant for allowing him to lie so long in such a state of suffering, he was assured that he had not lain an instant, but had been awakened the moment he began to sink. The gentleman after a considerable time recovered

from the affection.”* In this case, we have little doubt that there was a real constriction or spasm in the glottis, or some of the air-passages, which became sensible only in the confined posture of recumbency, and during the low respiration of sleep.

We have little to say of the treatment of nightmare, as it must depend on the correction of its several causes. Of these, too much or undigested food is among the most common; hence the propriety of prolonging the period between the principal meal and the hour of rest, as well as of avoiding crude and indigestible articles of food. (See INDIGESTION.) The symptoms of acidity and flatulence are to be treated in the usual way, by magnesia or alkalies, and essential oils or other carminatives; and when these fail, ether will often succeed in relieving the stomach of wind, and the nervous palpitation which often follows an attack of nightmare. Nor is it unimportant to pursue measures to prevent the recurrence of this disorder; for besides that it

“ — makes sleep a pain,
And turns its balm to wormwood,”

the disorder that it occasions in the circulation may, in those predisposed, bring on a fit of epilepsy or apoplexy, which not unfrequently occur during the first sleep.

(C. J. B. Williams.)

INDIGESTION.—This word is synonymous with *dyspepsia*, (from *δυσπεψία*, to digest with difficulty: Th. *δύς* and *πέψω*;) and signifies interrupted, laborious, or painful digestion; or, in other words, any derangement of that function by which the aliment, after having been received into the stomach, is converted into chyle.

The function of digestion is in its nature complex, consisting of the harmonious action of an apparatus of several organs, all mutually dependent upon the action of each other. These organs, singly, are liable to be disturbed by many different causes, which may each be again modified in their operation by a multitude of secondary and adventitious circumstances; and as every separate organ must perform its part healthily to complete the general function, so also the disorders of each individual organ may induce various derangements in the action of the whole apparatus. This view of the matter may give us some notion of the necessary diversity of the disorders of the function of digestion, and may serve to shew us that, whatever common denomination we may employ to denote its general derangement, we must comprehend different disorders, having their seat in different organs, depending on different morbid conditions, presenting various forms, induced by various causes, and all necessarily demanding various corresponding methods of cure. For though the disorder of one of the subordinate processes may induce the interruption or the disorder

* Sir Walter Scott's Letters on Demonology, p. 43.

of the whole function, and thus may seem to lead only to the same common disease, yet even under this supposition it is not immaterial to ascertain where and in what manner the faulty series has commenced, whether the impediment may have arisen in the stomach, the duodenum, the liver, or in any other organ; but it is also necessary to be acquainted with the particular modification of the function of either of these organs, for in this consists the nature or proximate cause of the disease: just as in the derangement of a watch, though the motion of the entire mechanism may be arrested by the disorder of some of its parts, the artist finds it necessary to discover in which the error lies, whether in the spring, the verge, or the balance, and whether the fault consists in excess or in deficiency of momentum or of matter.

That which physiology leads us to anticipate, observation fully confirms; for pursuing a contrary course of investigation, tracing effects up to their causes, we shall have still greater reason for admitting the diversity of the disorders of the function of digestion. Thus it would be contrary to all the common principles universally admitted in reasoning concerning natural phenomena, to suppose that the most opposite symptoms could arise from the same pathological state of the digestive organs,—that causes the most contrary could induce the same morbid condition, and that methods of treatment in direct opposition to each other could generally overcome one and the same disordered state. Thus,—that an impaired and fastidious, and a keen, craving, insatiable, nay, bulimious appetite; that an unquenchable thirst and a complete disrelish for liquids; that painful sensations of the stomach excited by the presence of food, and others relieved by the presence of food; that pain before eating and pain after eating; that an exalted sensibility of the organs rendering the patient painfully conscious of the whole process of digestion, and a diminished sensibility of the stomach by which a patient, though suffering from, is altogether unaware of, any disorder of the digestive function; that the more easy digestion of solid food by some, and of liquids by others; the agreement of fat or oily substances with some, of albuminous with others; of saccharine matter with one, acidulous with another; that a deranged state of this function, constantly accompanied with a moist, pale, white, or coated tongue, or with a clean, dry, red, appearance of the tongue; with a clammy, moist, perspiring, or a dry, shrivelled, impervious skin; with unhealthy, fetid, alvine discharges, or with evacuations which betray no sign of disorder; with a perfectly healthy state of the urine, and a highly unnatural state of that secretion; not to mention secondary and sympathetic affections, various, contrary, and incompatible with each other;—that all these discordant symptoms should emanate from one and the same morbid condition of the digestive organs, is a supposition altogether incomprehensible, and totally at variance with the acknowledged laws of

order, constancy, and consistency, which regulate natural events.

In the same manner,—that fasts and surfeits; that repletion and starvation; that taking food too frequently and fasting too long; that the richest viands, the most refined preparations of food, and cold, crude, vegetable fare, without seasoning or condiment; that the varied repast of the most pampered, with every thing to whet and every thing to sate the appetite, and the simple scanty food, greedily devoured for very existence, (whether the potatoe of the poor Irish, the oaten cake of the Scot, or the salted and smoked fish of the Swedish peasant—all three well known to be equally great sufferers from dyspepsia); that wine-drinking and water-drinking; that dry diet and fluid diet; that excessive indulgence in sleep and overwatching; that inactivity of body and excessive fatigue; that indolence of mind and intense bent of thought; that the ennui of the fashionable idler, and the wearisomeness of the artisan; that the anxious cares of business, and the languor of inaction; that dwelling in dry, warm, badly ventilated apartments, and constant exposure to cold moist air; that the too frequent use of the warm bath, and the habitually squalid unwashed skin:—that all these ordinary causes of dyspepsia, so much at variance with each other in their nature and effects, should yet conspire in producing only one disease,—only one pathological condition of the digestive organs,—involves the absurd conclusion, that in the actions of the human body the most opposite causes have, in similar circumstances, the same identical effects.

And no less from the different nature of the means by which the disordered conditions may be corrected or removed, than from those by which they may be induced, shall we have reason to affirm that the derangements of the function of digestion are many and various: or we must suppose that a dry and a fluid diet; that a full diet and a scanty; that one of animal food and one of farinaceous; that a stimulating diet and a cooling; that distilled or fermented liquors and water; that alkalies and acids; that bitters and sweets; that tonics and demulcents; that stimulants and refrigerants; that repletion and depletion; that sipping brandy and sipping ices; that heat and cold; that the warm-bath and the cold-bath;—that means so dissimilar and methods so repugnant to each other, have yet the same operation upon the living body.

From this diversity of symptoms, of causes, and of means of cure, it is more reasonable to infer a corresponding diversity in the morbid condition of the digestive organs, than to embrace the absurdity,—belied by all experience, and only consistent with our superficial learning in the language and grammar of the Book of Nature,—that the same things can have contrary signs, or that in similar circumstances opposite causes can produce the same effects.

It may seem that on this point,—the different nature of the disorders of the function of digestion,—we have insisted too much; and indeed we should have thought it unnecessary

to have pressed upon the attention of the profession a matter of such obvious importance, had we not occasion daily to observe the general tendency to apply to all these disorders the same method of treatment, as if they invariably constituted merely one and the same disease. The late Dr. Cullen, by affixing a general term to these disorders, may be justly charged with having in no inconsiderable degree promoted this error; but we are likewise not aware that any writer has felt more forcibly than himself its practical inconvenience. "We have established," says he, "a genus of disease under the title of Dyspepsia, and perhaps there was no avoiding it, but it is too general, and under this generality of little use. It comprehends every irregularity in the functions of the stomach; but these are certainly of great diversity in their nature and causes, and we want more accuracy and precision than we yet have."* In this circumstance of the great diversity of diseases comprehended under one common name, has originated the chief impediment to the successful medical treatment of dyspepsia; for it is self-evident that, as its different forms require to be met by corresponding methods of cure, the skill of the physician must mainly depend upon the power of distinguishing them, so as to be enabled to apply to each particular form of disorder its especial remedy, and also to adapt as nearly as possible the modification of the treatment to the modification of the disorder. The perfection of medical skill is most unquestionably the talent of applying to each individual case its precise, and, as it were, its individual cure,—an object which, though difficult of attainment, ought nevertheless to be the constant aim of the physician—the object which he ought unceasingly to pursue, and never rest until he has overtaken. Furthermore, we are very much inclined to suspect that a great part of the real secret of specific remedies lies in this, that they, being only applicable to diseases of one form and few specialties, are on this account alone so constant in their effects. In some degree in confirmation of this opinion, we may observe that when any specific disease, by complication or otherwise, assumes any remarkable deviation of character, then the specific remedy becomes dispossessed of its power. So that the success of these remedies does not so much depend upon any exclusively specific relation between the nature of the medicine and the nature of the disease, (for we know that syphilis is to be cured by other medicines than by mercury; that psora is curable by hellebore as well as by sulphur; that agues may be arrested by arsenic as well as by quinine,) but upon the medicine having the power of curing a disease which is comparatively constant in its character, its operation not being liable to be frustrated by any peculiar modifying circumstances;—the disease thus specifying the remedy, not the remedy the disease.

This view of the matter should afford us

reason to hope, that if in diseases less constant in their character and more variable in their accidents, we could meet the specialty of disease by its corresponding specialty of cure, we might also hope for an equal success, of which we have already some example and foretaste in the method of treating some diseases; as, for instance, in the plan of cure followed so successfully by the Pères de la Charité in colica pictonum. It should also teach us that, instead of ransacking every kingdom of nature for specific remedies,—a pursuit literally preposterous,—it is more reasonable, and would most certainly turn to better account, to seek for specific diseases, or by a proper specification, which is the very spirit and essence of practice, to endeavour to make them such. This is the object we have chiefly in view in the following article,—rather a sketch than a treatise of dyspepsia,—namely, to decompose the false and artificial genus comprehended under this term, to endeavour to establish a natural one in its stead, and by a proper classification of causes, symptoms, and methods of cure, to distinguish and define the different kinds of the disorders of the function of digestion,—*eorum tempora et causas in quibus medicinæ summa est*,*—so as to be able to establish a more close and accurate relation between each variety of disorder and its most appropriate remedy, in order that more certainty and more success may attend its application. "Ideoque dubitandum non est, quin si medici, missis paulisper istis generalibus, naturæ obviæ ire vellent, compotes ejus fierent, de quo ait poeta :

" ' Et quoniam variant morbi, variabimus artes ;
Mille mali species, mille salutis erunt.' "†

On reviewing the labours of our predecessors, we are confirmed in these opinions, for we find that the best observers have recognised great diversity in the disorders of the function of digestion, and that though, masking them each with his own particular theory, they have disguised them under particular names, there remains a remarkable coincidence in their observations and in their principles of distinguishing them. Thus we find that Hippocrates‡ made a distinction between gastric and intestinal dyspepsia, to which corresponded the *passio stomachica et ventriculosa* of the Methodists.§ This distinction was revived by Hoffman|| and others, was insisted upon by Pinel,¶ and indicated by Ferriar** and Warren,†† but was never accurately and precisely laid down before the able and useful lecture of Dr. G. D. Yeats upon the diseases of the duodenum.‡‡ Thus Celsus establishes several different disorders of the function of digestion, founded chiefly upon the different morbid

* Celsus.

† Bacon, De Augmentis Scientiarum.

‡ Aphor. sect. iv. Aph. 17-20.

§ Cælius Aurel.

|| De Duodeni morbis.

¶ Nosographie Philosoph.

** Med. Hist.

†† Med. Transac. vol. iv.

‡‡ Id. vol. vi.

conditions of the organs, to each disorder assigning its appropriate remedies.* In the different disorders of the digestive organs noticed by Celsus, not, however, to be all admitted as species really distinct, might no doubt be found most of those recognised by more modern writers; the simple dyspepsia of the solidists, the chylopoietic disorder of Mr. Abernethy, and the chronic gastritis of Broussais. In the disorders of the function of the stomach the Methodists acknowledged two principal divisions, *stomachica passio solutionis et stricturae*,† which were again by many of the sect variously subdivided. The former we shall find equivalent to the simple dyspepsia of the moderns, but in the latter may be found a strong resemblance to the dyspepsia from morbid sensibility and irritability of the stomach noticed by Cheyne,‡ Whytt,§ and Pemberton,|| but more insisted upon of late years by Barras¶ and Dr. James Johnson.** Others, building upon shifting quicksands, founded the distinction of the different kinds of dyspepsia upon their symptoms; and thus Galen, who defined dyspepsia to be any depravation of the alimentary mass in the stomach by which it was changed into something different from its natural product, distinguished dyspepsia into two species, *nidorous* (κνιδώδης) and *acid* (ὀξύδης), marking two of the most ordinary effects of indigestion. In this principle of distinction, Galen was followed by the symptomatic nosologists, who carried it to such a height, that the disorder was decomposed into all its various symptoms, each being made to constitute a distinct and independent disease.

To this error Cullen opposed another, still more pernicious, for he gathered together all the symptoms of disordered digestion, and thus formed his genus, *dyspepsia*; a genus illogically constructed, without species to support or sustain it, in which all previous distinctions were lost and confounded. Cullen, as we have already had occasion to remark, was himself more fully aware of the inconvenience of this arrangement than his followers; but it was not until—recovering the traces of the earliest physicians, and following the more recent examples of Dessault, Richter, Schmucker, and Scarpa,—after having incurred the just criticism of Fischer, a German, and having had the subject boldly unfolded to them by Halle,†† a

Frenchman, and when the attention of the medical profession of England had been fully concentrated on the disorders of the digestive organs by the writings of Dr. Hamilton* and Mr. Abernethy,†—disappointed by the generic treatment, and dissatisfied with the generic knowledge of dyspepsia, observant practitioners felt the want of better distinctions; and a spirit of specification commenced, which, still in progress, is yet, we hope, far from having reached its utmost limits. Of this spirit the earliest signs, we think, are to be found in Pemberton,‡ who was followed by Stone§ and by Warren.|| It is to Dr. G. D. Yeats,¶ however, that we are indebted for one of the most important contributions. About this time appeared Broussais, a bold reformer in physis, to whom the world is under deep obligations for subjecting the nature of dyspepsia to a searching analysis, but who in exposing one error plunged into the opposite, perhaps a greater one. With the same object in view, Dr. Wilson Philip,** an original observer, pointed out some valuable practical distinctions in these disorders; and though his work may fairly lay claim to be considered the most comprehensive and the most original which we possess upon the subject of indigestion, we are of opinion that, admitting only one primary form of dyspepsia, he laid too narrow a foundation for rearing a complete and correct classification of this disease. Other candidates have since appeared in the same field of enquiry, who have more or less helped towards the completion of this work. In chronological order, we find Dr. Ayre,†† who has chiefly considered one form of the disease; our esteemed friend, Dr. Marshall Hall,‡‡ a physician of fine and distinguishing observation, who, under the term of *mimoses*, has treated the subject of symptomatic diseases with much judgment and discrimination; Mr. Law,§§ who has made some original observations on the various kinds of costiveness; Dr. Paris,||| who, from the physiology of the function of digestion, has deduced some valuable conclusions concerning its disorder; Dr. James Johnson,¶¶ who has checked and corrected the hasty generalization of Broussais and his adherents; our excellent friend Dr. James Clark,** an acute and a scrupulous observer, who has very accurately described two different species of these disorders; Mr. Cook,††† an able and

biliare comparé à celui de plusieurs autres Maladies chroniques, et sur les Avantages de la Méthode évacuante. Mém. de la Soc. Roy. de Méd. 1806, p. 310.

* On Purgative Medicines.

† On the Constitutional Origin of Local Diseases.

‡ Op. cit.

§ On Diseases of the Stomach, 1806.

|| Med. Trans. vol. iv. p. 233.

¶ Med. Trans. vol. vi. p. 325.

** On Indigestion, 1821.

†† On Marasmus.

‡‡ On the Mimoses, Lond. 1818.—Commentaries on some Diseases of Females, 1827.

§§ On the Digestive Organs.

||| On Diet.

¶¶ Op. cit.

** On the Influence of Climate, &c.

††† On the Digestive Organs.

* Besides *cruditas* and *concoctio tarda*, which are repeated in several places, we have the following comprehensive passage: "Faucibus subest stomachus; in quo plura longa vitia incidere consuerunt. Nam modò *ingens calor*, modò *inflatio hunc*, modò *inflammatio*, modò *exulceratio* afficit; interdum *pituita*, interdum *bilis* oritur: frequentissimumque est ejus malum, quo *resolvitur*: neque ulla re magis aut afficitur, aut corpus afficit." Lib. iv. cap. v.

† *Celsus Aurelianus*.

‡ English Malady.

§ Nervous Diseases.

|| Diseases of the Abdominal Viscera, &c.

¶ *Traité sur les Gastralgies*, &c.

** On the Morbid Sensibility of the Stomach, &c.

†† *Réflexions sur le Traitement de la Manie atra-*

observing practitioner, who has illustrated his distinctions of the disease with very interesting cases; and lastly, Dr. Mayo,* who has called the attention of the profession to the importance of considering the influence of temperance in the treatment of indigestion. But it is due to the memory of Mr. Abernethy to state, that, though he did not co-operate in the task of distinguishing and specifying the disorders of the function of digestion, he looked forward to its accomplishment,† and insisted on its importance. It is only matter of deep regret that he should have contented himself in his first position, instead of methodizing and digesting his ample store of accumulated experience, and of thus advancing forward to the consummation of his enterprise.

Digestion, like any other function of the body, may be disordered in consequence of some morbid condition of its proper organs, or it may be disturbed in consequence of the morbid condition of the body in general, or of some organ in particular. This affords the leading division of dyspepsia into *idiopathic* or *primary*, and *deutero-pathic* or *secondary*, the most important practical distinction of every disease. But the disorder of a function may arise either from some change of action of the organ,—some new modification of its vitality,—or it may depend upon some lesion of structure; from this is naturally deduced the division of *primary* dyspepsia into *functional* and *organic*.

And as the disorder of a function may be either the effect of disease of the whole body, or of some particular organ or apparatus of organs, *secondary* dyspepsia may be conveniently divided into *symptomatic*, forming only a part of a more general disease, and *sympathetic*, the consequence of consent with the disorder of some other organ.

The disorder of the function of an apparatus of organs may either predominate in some particular organ, or may involve the whole apparatus; a consideration which, in the instance of dyspepsia, leads to the distribution of the previous divisions into four natural orders, according as the *stomach*, or *duodenum*, or *colon* is the exclusive or principal site of the disease, or as it involves more or fewer of these parts at the same time; whilst the different morbid conditions which any of the particular organs, or the whole apparatus may assume, afford an easy method of distinguishing these orders into different species. The morbid conditions by which the action of the organ may be modified, have been recognised by the best observers under the terms, *atonic*, *irritable*, *inflammatory*, and *follicular* or *pituitous*: in these morbid conditions, easily cognizable and perfectly capable of verification by the symptoms, consist the proximate causes of functional dyspepsia. Those in which the structure of the organ is altered, admit of being distributed according to the nature of the struc-

tural lesion, or as the function becomes disordered by change of capacity, sensibility, or in its secretory function. *Symptomatic* dyspepsia might be divided into species according to the constitutional disease in which it might originate, whether fever, plethora, anæmia, asthenia, or any other form of constitutional disorder; and *sympathetic* dyspepsia would admit of a convenient division according to the organ from whose disorder it took its rise, as the brain, the lungs, the skin, the kidneys, the uterus, or any other organ.

Such is our plan of a complete natural classification of the various disorders of the function of digestion, the result of close and continuous observation, combined with a methodical arrangement of cases; those being grouped together which coincided in causes, symptoms, and means of cure; and each group being denoted by the pathological derangement on which we supposed them to depend. Pursuing this course, it will be observed that we have arrived at distinctions nearly coinciding with those of our predecessors, a strong proof of their correctness, which, verifying our observation by that of the great masters of our art, establishes these distinctions on a long line of uninterrupted experience. But before concluding this part of our subject, we must observe that, whatever objection may be taken to our pathology, to our opinions, or to the terms by which the different species are denoted, it will afford no ground for denying the existence of these species; for being founded on observation and formed inductively, they must survive any error of opinion; and the classification, being natural, has this advantage, that as any new species of disorder of the function of digestion may be discovered and ascertained, (as no doubt, hereafter, many most certainly will be), their place or niche will immediately be found without the necessity of the whole structure being broken down and rebuilt, as constantly happens with artificial classifications. The nature of the present work does not, however, admit of the possibility of following up the whole of this plan, and requires that we should confine ourselves to the first division of the subject, *idiopathic functional dyspepsia*; but we shall endeavour, by way of help, to avail ourselves of the corresponding facts of the other divisions, to confirm, explain, or illustrate any part of this. The following outline presents the plan of classification, and enumerates the several species to which we hope to be able to refer the greater part of the varieties of this disease.

IDIOPATHIC FUNCTIONAL DYSPEPSIA.

I. GASTRIC.

- a. *Atonic.*
- b. *Inflammatory.*
- c. *Irritable.*
- d. *Follicular.*

II. DUODENAL.

- a. *Atonic.*
- b. *Inflammatory.*
 1. *Strumous.*
- c. *Follicular.*

* Essay on Indigestion, 1831.

† The Constitutional Origin of Local Diseases, &c. p. 17, 48.

III. COLONIC.

- a. *Atonic.*
- b. *Inflammatory.*
- c. *Irritable.*
- d. *Follicular.*

IV. GASTRO-ENTERIC.

- A. *Enopathic.* The same morbid condition obtaining throughout the whole alimentary canal.
- B. *Polypathic.* Different morbid conditions existing in different parts of the alimentary canal.

I. GASTRIC DYSPEPSIA.

The disease consisting chiefly in disordered function of the stomach.

I.—*Atonic gastric dyspepsia.*

Synonyms.—ἄπειψιν, πλυσμὸν, Hipp.; stomachi resolutio, cruditas, Cels.; frigiditas stomachi, Prosp. Alpin.; anorexia, plethorica, arthritica, paralytica; nausea a cacochylia; vomitus a saburra; flatulentia, acida, nidorosa; cardialgia a saburra, paralytica; gastrodynia saburralis, Sauvages; dyspepsia idiopathica; anorexia atonica, Cullen; saburra materiæ mobilis, Auctor. Var.; indigestion, first stage of W. Philip; dyspepsie, apyrétique, asthénique, Broussais; dyspepsie per asthénie de l'estomac, Andral; embarras gastrique.

General character.—Loss of appetite, sometimes nausea and loathing of food, with occasional inclination to vomit, but seldom sufficient to provoke vomiting; thirst after eating, not after digestion; heartburn; acid, nidorous or putrescent eructations; sense of weight at the epigastrium after a meal; power of digestion more particularly impaired as regards oily, fatty, mucilaginous, saccharine, and acidulous substances; tongue pale, flabby, whitish or slimy, more or less coated; bowels generally confined; urine clear and copious, devoid of its natural smell, deficient of urea, sometimes albuminous, and then disposed to putrefy on standing; pulse somewhat weaker, generally slower than natural; temperature of the body lower than natural and unequally distributed; extremities cold, countenance pale, skin flaccid, eye dull; listlessness in expression, languor in motion, obtuseness of feeling, mind impaired in vigour, in all things a want of alacrity.

These symptoms depending chiefly on the morbid condition of the stomach, are subject to considerable variation from the presence of crudities, being different as the stomach is full or empty. But the general character of the symptoms is not destroyed by this cause of variation; for, as the different morbid conditions give rise to different symptoms, so the presence of crudities excites symptoms, subject and corresponding to each morbid condition.

The symptoms also vary as they may happen to be direct or indirect, as they emanate immediately, from the suffering state of the stomach, or, mediately, as the suffering of the stomach is felt and reflected in the sympathetic disorder of some other organ. The variation and diversity of the symptoms of atonic gastric dyspepsia

arising from each of these sources, will be noticed in describing this disease according to the two forms under which it presents itself, as it takes place suddenly, or as the symptoms manifest themselves in a slow and gradual manner.

a. *Acute form.*—In the first case, which might for the sake of distinction be termed *acute atonic gastric dyspepsia*, corresponding more precisely with the ἀπειψιν of Hippocrates, the cruditas of Celsus, and the embarras gastrique of the French, the disorder comes on in distinct attacks or paroxysms, the patient enjoying in the intervals a comparatively healthy state of digestion. As the disease continues, these attacks are repeated at shorter intervals, whilst the interval itself becomes a state of less perfect health, and the disease, growing more and more habitual, at last arrives at that state in which disorder of the digestion is more or less constantly present, though in a degree less severe than during the intensity of the paroxysm.

These paroxysms vary in their duration from three or four to twenty-four hours or even longer, being shorter in young, and longer and more frequent in older persons and those most disposed to them. As the paroxysms are induced by accidental causes, their return is of course irregular; but, as has just been observed, the liability to them increasing with repetition, slighter causes are capable of inducing them, and they are therefore, *ceteris paribus*, more frequent in old than in young subjects, some suffering a paroxysm every two or three days, others once in two or three weeks.

The patient may have been feeling dull or heavy, have been losing his usual relish for food, may have observed his bowels less regular, or have been complaining of that peculiar sensation at the root of the tongue, and sometimes through the whole length of the œsophagus, which constitutes what is called heartburn; but as it is generally during sleep that the paroxysm comes on, it is in the morning that the symptoms of indigestion are first distinctly pronounced. The patient awakes with headach, or feels heavy and languid, devoid of his wonted alacrity, and indisposed to leave his bed. There is rather flatness than lowness of spirits, with sometimes slight confusion or indistinctness of intellect. The tongue feels clammy, sometimes it is also dry; there is generally an insipid taste, but sometimes it is milky or sweetish, occasionally sourish. The appetite is impaired or entirely deficient, sometimes with nausea, amounting occasionally to a disposition to vomit, and when vomiting does occur, phlegm only is thrown up; or there is a capricious appetite, craving for some unaccustomed kinds of food, but which are seldom agreeable if presented. When the attack is slight, the symptoms are occasionally suspended by taking some grateful food, the action and sensibility of the stomach being revived and restored by being gently solicited. Generally there is an aversion to acids, sweets, or any thing insipid. There may be heartburn, eructations of acid, of oily or rancid matter, sometimes of hepatic

gas, or a feeling of weight or load at the stomach, giving the sensation that the process of digestion is entirely at a stand. In other cases there is a sense of constriction of the fauces, with a watery secretion from the back part of the mouth. Sometimes the patient is suddenly awakened by cramp in the legs, or violent spasmodic pain in the stomach, (*gastrodynia saburrealis*,) accompanied frequently with violent retching. The face is pale, the countenance inexpressive, and the eye dull and heavy, with sometimes a dark discoloration or puffiness round the eyelids. The pulse is somewhat weaker, generally slower, usually soft, frequently languid and feeble, sometimes small and quick, occasionally intermitting. The skin is moist, clammy, and flaccid, and generally cold. The feet and hands are cold, with a general feeling of chilliness or creeping over the skin, sometimes amounting to rigors; sometimes there is a particular coldness, stiffness, or numbness of the fingers. The tongue is pale and flabby, generally moist, and covered with a loose slimy white coat, more or less thick. The bowels are constipated; sometimes there is a sensation of inaction or of dryness in them. In the commencement of the paroxysm the urine is pale and copious, less frequently it is deficient; but in its decline it becomes high-coloured and turbid, depositing a red sediment of lithic acid, or of lithate of ammonia, or the amorphous sediments of the lithates generally.

The above is an account of an attack of atonic dyspepsia connected with, or arising from, a state of repletion of the stomach; but the same state may arise from that organ being deprived of its accustomed stimulus or supply, as occurs to delicate people when they pass the hour of their accustomed meal. They have a great sense of weakness, sometimes faintness and trembling; they lose their appetite, have a bitter taste, and a sensation of weight or sinking at the præcordia; their countenance becomes pale and wan, their eyes sunk; they lose their temper and their spirits; their urine becomes hot, scalding, and high-coloured; if they attempt to eat, they have no appetite or a disgust for food, and if they eat, all their symptoms are increased. They have a difficulty in getting to sleep, or are disturbed with dreams. Giddiness, headach, coldness, trembling, constant yawning, are common attendants of this state of the stomach.

The sympathetic affection most universally connected with this form of disordered digestion is headach, which, being generally associated with nausea, is well expressed by the common term *sick-headach*.* It affects generally one particular part of the head, chiefly the forehead, or is seated over one or both eyebrows, and sometimes in the ball of the eye. The pain is heavy, dull, and overpowering, but seldom acute. With the headach, the whole nervous sensibility appears to be concentrated in the head, where it is much increased, being accompanied with intolerance of light and of

noise. The headach begins sometimes to abate on a vomiting of bitter or acid matter, but sleep is the most constant harbinger of relief. As the headach abates, it leaves a general soreness or tenderness of the head, and the squeamishness and general uneasiness continue for some time after.

The other affections frequently observed, sympathetic of *acute atonic gastric dyspepsia*, are a sensation of mistiness before the eyes, indistinctness or offuscations of vision, sometimes amounting to temporary amaurosis, and more rarely, dilatation of the pupil, without any defect of vision; deafness, and sometimes unusual sounds in the ear; loss of smell or taste, or depravation of these senses, so that unnatural smells and flavours are perceived, when there is no external impression; in delicate and sensitive persons, fainting, and in women hysterical fits occur; trismus, convulsions, and, in those predisposed, a fit of epilepsy; loss of voice, paralysis, a fit of apoplexy; spasmodic cough, a fit of asthma or of angina pectoris; neuralgia and various local pains, temporary delirium, a fit of mania, urticaria, erysipelas, and some other cutaneous affections. But many of these complaints are more especially connected with one of the effects of this disorder, distention of the stomach, the direct symptoms of which are restlessness, a sense of oppression, and anxiety.

Causes.—This particular form of dyspepsia most frequently makes its first appearance in early and middle life, from puberty to the age of thirty, less commonly after forty. Women are more subject to it than men. It is more common in cold than in warm climates, in cold than in warm weather; but moist climates and moist weather, whether warm and moist or cold and moist, have a great influence in predisposing to it. The middle and upper stations of life are most exposed to it. The predisposition to this complaint is sometimes hereditary, the person inheriting a relaxed constitution, or one of exalted nervous sensibility, but of weak powers; for it affects rather the cold phlegmatic and the asthenic habits than the sanguine or bilious temperaments; and chiefly those of that peculiar relaxed constitution characterised by want of firmness, resistance, and elasticity, by a soft relaxed skin of a pale colour, by a tendency of the hands and feet to be cold, by a languid circulation, by the functions of the body being imperfectly performed, either less actively or irregularly, and by the secretions being rather disposed to be copious than scanty. But this particular constitution may be also acquired by certain habits and manner of living, as by want of exercise, by indolence of body, by indolence as well as by intense or long application of mind, disproportionate to the strength of the body; by effeminate habits and enervating excesses, by the too frequent use of the warm-bath, by dwelling in close, warm, ill-ventilated apartments, by sleeping in hot soft beds, and by over indulgence in sleep. The habits of certain trades and professions contribute considerably to this disease; the confinement to

* *Fothergill*, Med. Obs. and Inq. vol. vi.

the desk, the sedentary occupations of sempstresses, milliners, mantua-makers, and tailors; those of the loom, of the tambour, of the stocking and lace-frame, and of laundresses who work much over a stove. For all these various reasons, this complaint prevails more in the town than in the country,* and is, as it were, endemic in the boarding-school, the boudoir, and in manufactories; at court, at college, and in prisons; and under the title of *asthenia* has been very well described by Dr. Willan in his account of the diseases of London. The habit predisposing to this disease may also be a consequence of loss of blood, excessive suckling, seminal weaknesses, leucorrhœa, or any cause which exhausts or debilitates the system in general; of the habitual use of narcotics in excess, as tobacco, conium, or henbane, which injure the sensibility of the nervous system. But the cause which has the greatest influence in disposing to this disease above all others, is habitual incaution in diet, both in respect of kind and quantity of food; for it matters not whether the stomach be frequently offended by that which it cannot subdue, or morbidly distended, and thus rendered incapable of appropriating that which is wholesome. For this reason offences against quantity are not less injurious than offences against quality, and both are doubly baneful when the repast consists of many kinds indiscriminately mixed. To these may be added an irregularity in the times of taking food, the meals being sometimes too frequently repeated, or the intervals too long protracted.

Where the predisposition is strong, or the patient has suffered long, slight causes are sufficient to produce a paroxysm of this form of dyspepsia; but where even neither natural nor acquired predisposition exists, certain circumstances are capable of producing an accidental fit of dyspepsia, and of thus laying a foundation for its recurrence. Amongst such may be enumerated any sudden or unusual disproportion or want of due relation between the digestive organs and the ingesta, a neglected state of bowels, intense application or strong emotions of mind, especially soon after a meal. A sudden fit of passion, or great joy, will sometimes instantly produce this affection. They will also sometimes remove it; "We have more than once," observes Pemberton, "known a necessity for a great exertion of mind to supersede the stomach affection, which has re-appeared on the necessity being withdrawn." Violent exertions or much fatigue of body, either immediately before or soon after a repast; any causes which induce sudden distention of the stomach, as a bulky meal of soft, sweet, pultaceous food, over-indulgence in fruit, large quantities of cold, iced, warm, acid, or sweet fluids suddenly swallowed, more particularly if the process of digestion is still in progress; a sudden change of diet from animal to vegetable food; mucilaginous drinks, &c. eating hastily after fasting too long, missing the wonted meal, or taking it

out of season; taking a cold or warm bath immediately before or soon after a meal; medicines, particularly calomel, conium, henbane, digitalis, ipecacuanha, especially administered at an improper period of digestion; venesection when performed soon after a meal, or leeches applied to the epigastrium under the same circumstances. In the delicate and predisposed, we have observed it excited by variable weather, by exposure to a cold and moist atmosphere, by the application of cold to the skin, particularly to the lower extremities, by sitting in a room of low temperature, so low as to cause a sensation of chilliness, by a change of wind, particularly from a north to a south-west gale.

b. Chronic form.—In this form of indigestion, which might be termed *chronic atonic gastric dyspepsia*, the *πλησμονή* of Hippocrates, the disorder creeps on in a slow insidious manner, and becomes scarcely apparent until it has existed for a considerable time. Some of the following symptoms, more or less grouped and combined together, afford indications of its approach: drowsiness in the day, particularly after a meal; sleep deep, heavy, prolonged beyond the usual hour; the sleep ceases to be refreshing and is disturbed with uncomfortable dreams, sometimes with incubus, and the patient awakes in the morning feeling fatigued, and having a disagreeable taste in his mouth;—less aptitude for exercise, frequent stretching and yawning, torpor or sluggishness in movements, which begin to require a greater effort; diminished activity of mind, mental occupations becoming laborious; diminished enjoyment of the natural appetites, less relish for food, by degrees diminished appetite, especially for breakfast; a sensation of heaviness in the head, of fulness or itchings in the forehead, of fulness or stuffing in the nostrils, particularly after a meal, with a frequent desire to emulge them; a feeling of huskiness in the throat, particularly in the morning, with expectoration of a grey, viscid phlegm, and sometimes an increased flow of saliva. A sensation of fatigue and weariness, sometimes amounting to pain, begins to be felt in the whole or in particular members of the body; a heavy dull pain in the head with drowsiness, a sensation of weight at the stomach, heartburn, or a sensation of internal heat after meals, more especially after breakfast; and the bowels begin to be habitually constipated. These symptoms are followed by distention after eating, by flatulence when the stomach is empty, at first relieved but afterwards increased by eating; by eructations of the last meal, sometimes acid, sometimes putrescent; by change of complexion, paleness of the face, which is bloated; by deficient alvine evacuations, altogether disproportionate to the ingesta, sometimes by diarrhœa of liquid and undigested food, which affords temporary relief; or by perspiration on the slightest exertion. The disorder may continue for a considerable time in the degree manifested by these symptoms without producing any serious derangement of the health; and, by change of habits, of air, and of

* At imbecillis stomacho, quo in numero magna pars urbanorum.—*Celsus*.

exercise, they may be entirely removed. But the long continuance of the disorder brings other derangements. The bowels become habitually confined, and there is a constant sense of fulness, distention, and dryness in them. The repasts cease to be pleasant or satisfactory, but are always followed by oppression; the extremities are generally cold, the power of exercise begins to diminish, the patient begins to lose flesh, and has a constant sensation of weakness, faintness, or trembling, or is troubled with vertigo or headach, with noise in the ears, throbbing of the temples, cough or fits of palpitation. The mouth feels clammy; the tongue is more or less furred, or has a whitish sodden appearance; sometimes the saliva runs from the mouth, and there is a viscid frothy secretion from the fauces, or there is frequent spitting. The skin is generally moist and clammy, sometimes cold; and perspiration is excited by the least exertion. The urine leaves a coating of lithic acid at the bottom of the utensil. The powers of the intellectual faculties, particularly of attention and memory, are remarkably diminished; the feelings are obtuse and little alive; the patient begins to feel flat, dull, and timid without reason, or sinks into a state of apathy or indifference, whilst the physical sensibility becomes morbidly increased, manifested by a remarkable sensitiveness of changes of weather, particularly of the approach of moist weather or storms.

The further course of the disease is generally very much influenced by the use of remedies, and by the different methods of treatment had recourse to; for if not properly administered, they are mainly instrumental in determining various forms of dyspepsia hereafter to be described. If the disease be allowed to follow its natural progress, it terminates by inducing a disordered state of the function of the duodenum and liver. More rarely the disease undergoes an entire change, which occasionally leads to a natural cure, in consequence of a fixed point of irritation becoming established in the intestines, the activity of the stomach is excited and increased, and the disease is transferred to the intestines in the form of diarrhoea, which, subsiding spontaneously or artificially, leads to a permanent relief of the primary disorder; but which continuing lays the foundation of a form of inflammatory dyspepsia to be treated of in the sequel of this article.

Causes.—This variety of atonic gastric dyspepsia is, with some exceptions, the consequence of the same causes as those which give rise to the first variety. It is less the effect of hereditary disposition, and more the result of the remote causes of dyspepsia operating insidiously upon a healthy constitution. In this way it is induced in people of regular and orderly lives, who seldom commit any offence against temperance or sobriety, and in people of sedentary, monotonous, indolent habits. It affects literary* and professional people, clerks, shopkeepers, and is met with in all constitutions, but in men rather than in women; it occurs generally late

in life, and prevails most in winter. A disproportion between food and exercise is the great cause of this disease; but indulgence in much warm liquid, as tea, pre-eminently the English breakfast, in relaxing slops, in meals too frequently repeated, deluging the stomach with tea whilst digestion is in progress, and the habitual use of malt liquor, are the most fertile sources of this disorder.

Pathology.—The morbid condition of the stomach, from which proceed the various symptoms of atonic dyspepsia, has been recognised by the very earliest physicians* under the term of *atony*, or some word of corresponding meaning, as *asthenia*, *relaxation*, *resolution*, or *debility*; and instead of this morbid condition of the stomach having been overlooked as the proximate cause of indigestion, it has, on the contrary, been too generally admitted, and the species of dyspepsia which is now under our consideration has accordingly been made to represent the whole genus, every symptom indicative of indigestion, every sign of chylopoietic disorder, having been attributed to debility or want of tone of the stomach.

A state of collapse, of deficient vital power or nervous energy, under various modifications and descriptions, has, as we have already observed, been universally admitted ever since the phenomena of life have been an object of observation. By the operation of certain causes the whole body may be involved in this morbid condition; by their more partial application particular parts or individual organs only may be placed under its influence. But as it is the nature of the body for a part to assume the state of the whole, and for the whole body to partake of the action of a part, whether the disorder be at first induced in the general system, or only in some particular part, in either case they both ultimately arrive at, and terminate in, the same condition. The digestive organs are not exempt from the operation of causes capable of inducing this morbid condition, and when the stomach, more especially, is placed under its influence, the disorder of the digestive function which we have just described is the consequence.

But by the term *atony* of the stomach we express a general and complex condition, resolvable into several subordinate or particular ones; for under it are included—1. a deficient innervation of the stomach, by which some unknown vital action is withdrawn, and the natural affinities of the constituent elements of the alimentary mass, instead of being directed and controlled, obey the laws of inorganic matter, rather than the special influence of organic life; 2. a depraved or deficient secretion of the gastric juice; 3. a diminution of the absorbing power of the stomach, by which the digestion of liquids is rendered more difficult; and, 4. a diminution of the contractile power of the muscular fibres of the stomach, by which this organ is prevented from compressing its contents, as in health, that the food and gastric

* Omnesque pæne cupidi literarum.—Celsus.

* Ἀτονίᾳ τοῦ πέψοντος ὁρμητοῦ, καὶ ψύξι τῆς κοιλίας.
—Arctæus.

juice being brought into contact may be exposed in successive and appropriate portions to each other's action.

It would not be difficult to trace the process by which the causes of dyspepsia induce the foregoing results. If we consider the nature of their operation, we shall find that they admit of a classification corresponding to the several morbid conditions just enumerated. Thus by sedentariness and repletion is destroyed the healthy equilibrium of waste and supply; for, as has been well observed, as, by virtue of the consent of every part of the living body, all the functions of assimilation can only be preserved in health so long as the stomach digests well, so on the other hand the stomach can only digest well so long as the different functions which convey and deposit the nutritious matter in the various tissues are healthily performed, which, however, cannot be the case when from indolence or similar causes there is both a deficient consumption of this nutritious matter, and a defective elimination of the effete and worn-out particles. The consequence is, that the whole process of nutrition languishes, and the stomach losing the stimulus of demand fails in its activity. This principle, recognized so early as Hippocrates in his famous dictum, *δίότι οὐ δύναται ἐσθίειν ἄνθρωπος ὑγιαίνειν, ἢ μὴ καὶ ποιεῖν*, explains the operation of many of the causes of dyspepsia, shewing how they may induce a deficient innervation of the stomach; and this will be the result whether the equilibrium be destroyed from the consumption being deficient or the supply being excessive. Then we may again observe that some causes induce the same effect by destroying the corresponding and harmonious action of the different parts of the alimentary canal; others by diminishing the natural sensibility of the stomach, either directly, as narcotics, or indirectly, by concentrating the nervous energy in the head, by intense thought and application; whilst others arrive at the same result, diminishing the innervation of the stomach, by withholding or diverting from it a proper and sufficient supply of blood, from which results an unhealthy and insufficient supply of the gastric juice; very contrary to the opinion of Parry, who attributes idiopathic dyspepsia to a morbid fulness of the vessels of the villous coat of the stomach. Other causes act by diminishing the contractile power of the muscular coat of the stomach, either by producing a relaxed state of its fibres, or by sustaining them in a state of unnatural distention, by which they lose the power of resuming their natural state: others effect their deleterious influence by withdrawing from the stomach the healthy and accustomed stimulus which calls it into action, so that it not rarely happens that, after having been more or less stimulated, withdrawing suddenly every source of excitement, the stomach falls into the opposite state, one of perfect atony; and this frequently occurs, whether it be the body in general, or the stomach in particular, which is deprived of its wonted stimulus and excitement.

This view of the operation of the causes which induce atonic gastric dyspepsia, and of the various morbid conditions which they produce, we shall find very much confirmed by considering the state of the body and of other organs in those cases in which this form of dyspepsia is secondary, whether symptomatic of general disorder, or sympathetic of the disorder of some particular organ; for we shall find that the dyspepsia of simple general plethora,* of asthenia or general debility,† whether induced by venereal excess or weakening discharges, of general anemia,‡ whether from loss of blood, or disorder of the process of sanguification,§ and the dyspepsia of gout,|| all belong to this form. In like manner we shall find that the dyspepsia sympathetic of cerebral irritation,¶ of hydrocephalus, of vertigo** and nervous headach, from accidental injuries of the head, from the action of narcotics upon the nervous system, as tobacco, digitalis, hemlock; the dyspepsia which follows a fit of inebriety,†† the dyspepsia of constipation, the dyspepsia of some forms of disordered uterine function, the dyspepsia of rigid continence,‡‡ and the dyspepsia which alternates with an atonic state of various other organs,§§ belong also to this form. The dyspepsia which is produced in animals by the division of the eighth pair of nerves, offers a strong analogical proof of the same position.

We may also find the view we have taken of the proximate causes of atonic gastric dyspepsia amply confirmed by examining cases of dyspepsia from organic lesion; for we shall find that, as the organic changes approach the morbid conditions of this form of dyspepsia, the symptoms of atonic gastric dyspepsia are present. Thus, when the stomach has been found unusually large and distended, with or without obstruction of the pylorus;|||| thus also in induration and thickening of the coats of the stomach;¶¶ in the early stage of diseases of the pylorus, or where there exists any obstruction to the egress of the chyme from the stomach;*** in atrophy of the mucous and muscular coats of the stomach; or when the stomach has been found lined with a false membrane; in the softening or solution of the mucous membrane of

* Anorexia plethorica.

† Anorexia exhaustorum, cardialgia lactantium.—*Sauvages*. Dyspepsia paralytica.—*Cullen*.

‡ Dyspepsia menorrhagica, dyspepsia chlorotica.

§ Halle, vid. Anémie, Dict. des Sciences Méd.

|| Anorexia arthritica, cardialgia arthritica.—*Sauvages*. Dyspepsia arthritica.—*Cullen*.

¶ Vomitus cephalalgicus.

** Nausea marina.

†† Dyspepsia inebriorum.

‡‡ Nausea a semine corrupto.—*Galen*.

§§ Gastrodynia metastatica.—*Cullen*.

|||| *Bonet*. sep. iii. vi. l. *Lieutaud* M. etc.

Par. 1756, 223. Cardialgia paralytica.—*Sauvages*.

Johnston, Med. Observ. and Inq. ii. 107. *Richt*.

Chir. Bibl. iii. 78. *Anderson*, Med. Comm. Ed. ii.

294. *Douglass*, M. Med. Soc. Lond. iv. 395.

Abercrombie, case v. p. 32, p. 70.

¶¶ *Abercrombie*, xvi. p. 59.

*** *Abercrombie*, xvii. p. 61. *Bonet*. sep. iii. vi. 2.

the stomach,* to which we may add anæmia of the alimentary canal, which is always accompanied with more or less attenuation of the coats,—a pathological state not rarely presented to the anatomist, but chiefly observed in the bodies of those exhausted by chronic diseases, or who sink during the convalescence of a severe fever;†—in all these cases the disorder of the function of digestion approaches the form of atonic gastric dyspepsia. But though approaching and resembling each other, the two disorders afford data of distinction; 1. by the absence of sympathetic affections; in the organic diseases of the stomach, the sympathetic headach and other disorders being never observed; 2. by the stomach being the seat of painful affections; 3. by the greater constancy and invariableness of the symptoms; and, 4. by the attendant emaciation.

Method of cure.—The treatment of *atonic gastric dyspepsia* is conveniently divided into the means of affording relief when the disorder is actually present, and the means of preventing its return.

I. The means of affording relief when the disorder is present consist in, 1. removing crudities or offensive substances directly from the stomach by vomiting; 2. in endeavouring to remove indigestible substances from the stomach, and restore its action by exciting that of the intestines; 3. by allowing the stomach to repose until its action begins to revive, and by soliciting its action as its sensibility returns; and, 4. by relieving the secondary affections which arise from the disordered function of the stomach.

1. Emetics afford the proper means of removing offending substances from the stomach. In the beginning of a fit of dyspepsia, in the earlier period of the disease, or in cases of accidental dyspepsia, an emetic frequently at once arrests the progress of the disorder, and we have known some persons subject all their lives to frequent paroxysms of the acute form of this disease, who have experienced more relief from emetics than from any other remedy. If, however, the paroxysm has continued long, or the disease has become habitual, they cease to bring their former relief, and, when unnecessarily administered, are always pernicious; ‡ for vomiting, whether spontaneously occurring or artificially excited, becomes itself a frequent cause of stomach complaints. It was a remedy much used and abused by the Romans, affording them the means of indulging their gluttony; *qui quotidie ejiciendo vorandi facultatem moluntur*: but it is a short-sighted compromise, granting no impunity; it changes but does not take away the penalty of the vice.

The immediate symptoms which more particularly indicate the administration of an emetic are nausea, a sense of weight at the præcordia, bitter eructations, the internal sensation of crudities, the mouth overflowing with saliva, and paleness of the countenance.

* *Ramollissement des Vieillards.*

† Andral. Path. Anat.

‡ *Inutilis est gracilibus et imbecillum stomachum habentibus.*—*Celsus.*

When vomiting is strongly indicated, it is easily excited. The gentlest means are therefore to be preferred, warm water, simple, or containing a little culinary salt, warm infusion of chamomile flowers, infusion of mustard-seed, and ipecacuanha, are means of different degrees of power which may be occasionally had recourse to; sometimes simply titillating the fauces answers every purpose. After vomiting, cold water is the best remedy for restoring the stomach; in summer iced water; sometimes Seltzer water. These should be sipped in small quantities at a time. After a proper interval a small quantity of light palatable food may be taken.

2. By virtue of the sympathy which exists between different parts of the alimentary canal, the function of the stomach is frequently restored by exciting that of the bowels, and therefore, when the attack has continued beyond that state in which emetics promise relief, or when they have failed of relief, purgatives are to be had recourse to. They should consist of such as are warm in their nature and speedy in their operation, but neither stimulating nor drastic. Rhubarb is decidedly the best. It may be advantageously combined with, and modified in its action by, magnesia, by carbonate of soda, by tartarized potass or soda, in conjunction with some aromatic or carminative distilled water, with a small quantity of the tincture of rhubarb or compound decoction of aloes, and a little of the compound spirit of lavender, or aromatic spirit of ammonia, as the state of the stomach or accompanying circumstances may suggest or indicate. In this form of dyspepsia senna is not proper, and saline purgatives alone are injurious, as are also the mercurial purgatives.

It is generally necessary to continue to promote the action of the bowels during the decline of a fit of dyspepsia, and for some days afterwards. For this purpose a few grains of rhubarb, in combination with a little soda or carbonate of ammonia, taken an hour before the two principal meals, answers very well; or the following formula of Fothergill affords a remedy well suited to this intention:

Rx Aloës ʒi.

Rad. rhei, rad. glycirrh. aa ʒʒss.

Spirit. lavand. comp. ʒʒss.

Aq. calcis ʒviii.

Infunde per horas xii et cola. Colaturæ cochl. duo bis terve die sumenda. On some occasions it suffices to relieve the bowels by clysmata, and when this method is found to answer, it is always to be preferred.

3. It would seem unnecessary to insist on the necessity of abstinence during a fit of dyspepsia; but it is not always superfluous, for the morbid sensations of the stomach sometimes imitate, and are readily construed into, that of hunger. They ought not, however, to be listened to, for abstinence is the chief remedy. The patient may drink, from time to time, a small cup of green tea, without sugar or milk, or a cup of coffee, moderately strong, with as little as possible of those ingredients; or he may take a small quantity of light pure broth,

sufficiently sapid to be agreeable, with a small quantity of stale bread or dry toast. As the natural sensibility of the stomach returns, it may be solicited by a little animal food, such as is palatable and easy of digestion. If the patient is accustomed to the use of wine, but not otherwise, it may be necessary to allow a moderate quantity with the meat: the red wines for this purpose are generally to be preferred. Farther than this the stomach is not to be excited. All such means of doing so, as brandy, capsicum, or food containing it; mustard, piquant sauces, curries, or high-flavoured dishes, are to be avoided. In this category we would also place bitters, and those medicines improperly termed stomachic. The action of the stomach ought never to be hurried or forced by stimulants; it can only bear them when its function has been already to a certain degree restored. Before this period they only tend to fix the disease. The state of the tongue affords the best guide for the use of food and its quality; as it is moist and disposed to clean they are admissible, and as it is dry they are to be forbidden.

4. Besides the general treatment of a fit of dyspepsia, there are painful symptoms and sympathetic affections which ought not to be overlooked, and, indeed, the relief of which is not without its influence upon the primary disease. But in administering means of relief for such affections, it is important to take care that they do not oppose, but are made subservient to, the plan of general treatment.

Heartburn.—Dr. Fothergill's formula, mentioned above, affords a good corrective of this symptom; *magnesia, liquor potassæ* (gut. x. pro re natâ), *ammonia subcarbonas* (gr. v.), lime-water; sometimes alkalis combined with bitters. We have found Seltzer water a very excellent remedy; and at other times repeated small quantities of very cold or iced water, taken when the stomach is empty. Heartburn which is habitual or of long standing is sometimes more effectually relieved by acids than by alkalis. Pemberton mentions having seen it subdued by the juice of half-a-dozen lemons taken daily, and recurring on the remedy being left off; but we imagine that the heartburn here meant is not that which proceeds from acidity, but the burning sensation depending upon a heated state of stomach, a symptom of another form of dyspepsia. In heartburn nitric acid is also a useful remedy; five drops of the diluted acid may be taken every four hours. We have also used successfully the phosphoric acid with the same intention, and have found it more agreeable to the stomach.

Flatulence.—This symptom is best relieved by combining a carminative with the aperient. Equal parts of the *pil. rhei comp.* and *pil. galbani comp.* form a convenient remedy; carbonate of ammonia in mint-water; very hot water in small quantities after a meal, is sometimes found a very efficient corrective of this symptom.

Distention of the stomach from flatulence to an extreme degree, in old people, is often attended with alarming symptoms, sometimes

convulsions, sometimes apoplexy. By extreme distention the muscular coat loses its contractility, and the mucous membrane its sensibility, and thus the usual remedies lose their power. In such cases mustard poultices applied to the pit of the stomach are of great service, whilst the internal means are put in use. The best of these are ammonia in infusion of horse-radish or of mustard-seed, and repeated draughts of water as hot as it can be taken. In extreme cases the use of the stomach-pump should not be omitted.

Nausea and vomiting.—When these symptoms continue after the stomach and bowels have been satisfactorily relieved, effervescing saline draughts, especially those prepared from the subcarbonate of ammonia, are suitable remedies; to these, if the symptoms are urgent, may be added a little spirit of lavender, camphor julap, and, in case of necessity, one or two minims of the "black drop." The hydrocyanic acid (gut. i ad ii.) has been also used with considerable advantage; but we believe it to be more efficacious in the other forms of dyspepsia.

Headach.—When this symptom does not subside with the primary affection, it may be relieved by valerian (tr. valer. ammon. or infus. valer.) either alone, or combined with camphor; if attended with sleeplessness, a small dose of pulv. *ipeacuanhæ comp.* may be given in camphor mixture, or a saline draught; or if heartburn be present, may be combined with *magnesia* or *liquor potassæ*. But a warm pediluvium, containing mustard or culinary salt, or evaporating lotions of vinegar, spirits of lavender and rose-water, applied to the head, are sometimes more efficient than internal remedies.

It would be extending this article too far to enter into the treatment of the other various secondary affections of this disease; we must content ourselves with referring to the symptomatic form of each of these disorders.

II. Having afforded relief to the urgent state of indigestion, it is the duty of the physician to direct his attention to the means of obtaining a permanent cure, which consists more in prevention than in positive remedies. The object to be held in view in the prevention of a disease has been clearly and succinctly expressed by Celsus—"quod vel corporis vel loci, vel studii ratio detrahit, cura restituit." Guided by this general view, seeking if possible to avoid or remove, if not to counteract the causes of the disease, we shall endeavour to fulfil this intention by indications derived from the nature of the operation of the causes in which it originates, and from the morbid condition of the stomach in which it consists. These indications serving as principles to direct our prophylaxis, and applicable, with some small modification, to every form of dyspepsia, may be stated to be—1, to render the process of digestion as easy as possible by a selection of food of a quality suited to the nature of the disease, and by a proper adjustment of the quantity suited to the power of digestion; 2. to excite the function of nutrition by proper exercise of body and mind; 3. to correct the

morbid condition of the stomach, the proximate cause of the disease.

1. This is beyond all comparison the most important point in prevention of this disease; the reducing the quantity of the food to the power of digesting and of appropriating it, instead of yielding to the cravings of a pampered appetite. The change ought to be brought about gradually, for in that way it is most agreeable to the habits of the body, and most likely to be persevered in; and if the diminution of diet is made with judgment and selection, it ought to be effected by withdrawing from it such articles of food as are difficult of digestion, and such as have a tendency to weaken the stomach. This object is best attained by confining the patient to a small spare diet of animal food, with considerable restriction in the use of fluids. It is in this form of dyspepsia that so much benefit has been obtained by strict adherence to a dry diet, and by avoiding a bulky meal. When the appetite flags, abstinence will be found a better whet than cordials, stomachics, or dainty fare. When the appetite does not fail, the patient should finish his meal without waiting for the sensation of satiety, taking care that he be not deceived by a morbid craving, the offspring of disease and bad habit, not, of health.* When any doubt as to quantity may arise, he may be assured that it is safer to err by taking less than enough than more than enough—"nunquam utilis nimia satietas, sæpe inutilis nimia abstinentia."

For breakfast coffee is to be preferred to tea, and should be taken with as little milk and sugar as possible, and with a moderate quantity of bread, which, with a little fresh butter, should form the repast. It is necessary that the bread should be limited, for if taken in excess it is a common cause of heartburn after breakfast. The dinner should consist of the lean of animal food, chiefly mutton, poultry, venison, game, with the exception of hare. Roast meat is to be preferred to boiled. Vegetables are to be eaten sparingly, or entirely abstained from; mealy potatoes mixed with the gravy of the meat, asparagus, soft young summer turnips, cauliflower, or French beans, are the only kinds admissible. Rice mixed with the gravy of the meat will be found a good substitute for vegetables. Eggs lightly boiled may be occasionally used. The fruits the least offensive are strawberries, the morel cherry, and the mulberry; but they should be eaten in the early part of the day, and never after dinner. Fluids must at all times be taken with the greatest moderation; the patient should not yield to every slight sensation of thirst; they should be taken slowly, a small quantity at a time, and should follow, never precede the meal. If the weakness of digestion or habit demand a stimulus, port wine and water or sherry and water are the best; malt liquors are to be particularly avoided. Three moderate meals is the best general rule for the periods of eating, taking care to eat nothing in the intervals, and avoiding suppers. It may be stated also as a general rule, that the food and drink in this form of dyspepsia should be

taken decidedly hot or cold, not tepid; that twice dressed meat should be scrupulously avoided; and that the meat should be eaten slowly, and thoroughly masticated.

It may not be easy to say strictly what kinds of food are wholesome and what are unwholesome, but there are some so decidedly so, that there can be no dispute about them. Dr. Mandeville's definition of wholesome, "what you like and does one no harm," allows a deceitful latitude to dyspeptics. The admonition of Celsus carries a stronger impress of wisdom and experience; "non quicquid boni succi est, protinus stomacho convenire, neque quicquid stomacho convenit, protinus boni succi est."

The kinds of food most decidedly injurious in this form of dyspepsia, and therefore to be avoided, are—fluid food, more especially that which is sweet, mucilaginous, or acid, such as contains much milk; all pultaceous diet, puddings or compound dishes, particularly meat pies or meat puddings; new bread, particularly with butter; heavy unfermented bread; hard-boiled compact fat dumplings; all preparations of milks, whether custards, creams, curds, or cheeses; all fat meat, particularly pork or bacon; all young meat, and all the gelatinous parts of meat; all salted or smoked meat; strong broths, gelatinous soups, or highly concentrated dishes; fish; melted butter, oil, sauces, spices, condiments, and pickles; all vegetables, more especially roots, with few exceptions,* particularly peas, beans, cabbages, waxy potatoes, cucumbers, and pot-herbs generally; fruit in general, whether fresh or preserved, jellies of fruits, figs, dried as well as green, currants, gooseberries, pears, apples, plums, apricots, melons, and all kinds of nuts or kernels; mushrooms, truffles, and morels; treacle and honey; malt liquor, particularly ale; perry, home-made wines, punch, shrub.

2. In the early stage of dyspepsia an increase of exercise admits of greater latitude of diet; when more advanced, it affords no exemption from strictness of regimen. But by exercise we do not mean those nominal kinds in which half of the body only is exercised, as a quiet sauntering walk, or the passive exercise of a carriage;—we understand active exercises, in which every part of the body is more or less in motion, sometimes one, sometimes the other. In persons of weak digestion the ancient physicians used to insist upon the exercise of the superior extremities, and we fully understand the nature of their advice.† It is impossible to lay down any precise rule for the extent of exercise, which must be proportioned to the strength and even the habits of the patients;

* The abstinence from vegetable food, which is a painful privation to most persons, might possibly be obviated by using a digester, by which the vegetables might be submitted to a temperature considerably higher than that of boiling water. The ancients considered the cabbage race of vegetables as rendered more wholesome by boiling them in two waters.

† Maximeque quæ superiores partes moveat, quod genus in omnibus stomachi vitiis aptissimum est.—Celsus.

but it should be continued for at least two hours daily, and be sufficient in degree to produce gentle perspiration.* The patient should by degrees overcome his habits of sedentariness, commencing by taking gentle exercise on foot and horseback between breakfast and dinner; he should then extend the period of his exercise, and, if possible, rise in the morning so as to allow of a little before breakfast; but this should always be the least fatiguing. As his strength increases, he may proceed to more active exercises, strong enough to excite perspiration, but not fatigue; such as walking over unequal ground instead of plain, climbing ascents, rowing, digging in a garden, cutting and clearing wood, drawing weights over a pulley, turning a heavy windlass, as in grinding malt; military exercises, drilling, or the gymnastic exercises; or such amusements as field-sports, as coursing, fox-hunting; swimming; or such active games as cricket, fives, racket, bowling, foot-ball, fencing, the broad-sword or single-stick, or playing at quoits. Sometimes it is necessary to impart interest to exercise. In such cases gardening, agricultural occupations, the practical study of botany, geology, entomology, have been found of eminent service. On this subject Dr. Cullen says, "as a bodily exercise I can say that walking has good effects. I have always thought it necessary to continue other amusements or business; and there are several instances of persons, who have long laboured under weakness of the stomach, being cured by watching the concerns of their farm, which obliges them to be much in the open air, and in constant gentle exertion. I have cured weak stomachs by engaging the persons in the study of botany, and particularly in the investigation of our native plants, and in other gentle and long-continued amusements, such as our game of golf."† It was observed during the late war, that many of our tradesmen who joined the volunteer corps, were, by their regular military exercises, entirely cured of their dyspepsia. When the weather does not admit of exercise in the open air, reading aloud, reciting, singing, flute-playing, the dumb-bells, battledoor, dancing, skipping, and such-like, afford useful substitutes.

Exercise should always precede a meal, and never follow it; neither should the patient sit down to eat in a state of fatigue or exhaustion. A little interval between exercise and eating is on that account desirable; and this interval would be advantageously employed in gentle friction with a flannel glove, (made best of a piece of coarse blanket,) or the flesh-brush. No active exercise should be used for at least two hours after eating.

It is an old rule of philosophy as well as of physic, that the body cannot be properly exercised without the mind, nor the mind without the body. This rule emanates from the twofold function of the nervous system, which

not only supplies the vital energy or power by which the entire process of organization is carried on, but also that by which the more distinctive offices of animal life, intelligence and voluntary motion, are performed. If the power of the body be occupied exclusively in either of these, the other languishes. Many familiar illustrations of the truth of this position will readily present themselves. Long-continued or intense application of the mind does not derange the function of digestion negatively, by interfering with the opportunities of exercise, but positively by withdrawing a portion of the power by which it is carried on. Indolence of mind, on the other hand, does not interfere with the function of digestion by withdrawing the power, but by withdrawing the stimulus, the pleasurable enjoyment which well-regulated occupation of the mind imparts to the whole functions of life. The functions of digestion may be deranged by three different states, obtaining between the exercise of the body and the occupation of the mind: 1st, the most usual, a total inaction and inaction of the body may coincide with a fatigued and exhausted state of mind; 2dly, a state of indolence and sluggishness of mind, with inaction of the body; or, 3dly, a fatigued and exhausted state of body may coincide with a wearied and worn state of mind. The two first cases only apply to the present form of dyspepsia, and the indications deducible from them readily suggest themselves. The studious should, therefore, relax from their application, nor urge and overstrain the attention too long and too far; and though entire repose may not be allowed, their studies may be varied, that the different faculties of the mind being exercised* may relieve each other. It was a correct observation of a learned physician, that indigestion follows learning as close as the shadow follows the body. "Omnesque pæne cupidi literarum" Celsus considers the most constant sufferers from dyspepsia; and Aræteus has painted with his most vivid colours the painful sufferings which await a devotion to science and letters, *δείας μὲν μαθήσεως πρὸς*, when ill regulated and unrestrained. If study cannot be dispensed with, at least all application soon after a meal may be abstained from.† The indolent, on the other hand, should seek occupation, and thus avoid the pains of inaction. But in making these changes, care is to be taken to avoid running into the opposite extreme. Fatigue of body discomposes the sedentary, vacuity of mind is irksome and oppressive to the learned and to the man of business, and much study or business overcomes the indolent. Let them seek, then, occupations in which exercise, amusement, and interest may be happily combined, for they may rest assured it is a policy both narrow and short-sighted, which does not allow some hours a day to the care of their

* Levat quoque lassitudinem etiam laboris mutatio: cumque quem novum genus ejusdem laboris pressit, id, quod in consuetudinem est, reficit.—Celsus.

† Sin lucubrandum est, non post cibum id facere, sed post concoctionem.—Celsus.

* Exercitationis autem plerumque finis esse debet sudor, aut certe lassitudo quæ citra fatigationem est; idque ipsum modo minus, modo majus.—Celsus.

† Op. cit.

health. "Quem interdiu vel domestica vel civilia officia tenuerunt, huic tempus aliquod servandum curationi corporis sui est."*

3. This indication; correcting the morbid condition upon which the disease depends, according to our pathology, subdivides itself into (a) endeavouring to restore the harmonious action of the different parts of the alimentary canal; (b) restoring or increasing the activity of the excretory organs, and (c) restoring the tone, or improving the innervation of the stomach.

a. To restore the corresponding and harmonious action of the different parts of the alimentary canal. In health there exists a sympathetic relation and corresponding action between the different portions of the alimentary canal. Whilst some are in action, others are in repose, or the action of one part induces that of another. This relation is most remarkable between the stomach and larger bowels; and it is frequently one of the first effects of the operation of the causes producing dyspepsia to destroy or derange this relation; either by the patient not lending a ready obedience to the calls of nature, by losing the habit of it, or, by the sensibility of the stomach becoming altered, the natural intimation ceases to be transmitted to the bowels, and then the parts lose their correspondence. This state is to be corrected by endeavouring to restore the habit of a daily evacuation after the first meal, which is natural to most people in health. For this purpose the water-closet is to be visited even when there is no call from nature. When this does not succeed, the patient may relieve the bowels every second morning by a lavement of warm water. He should only have recourse to aperients when neither of these means succeed, but which will seldom be the case if he has observed those rules of diet, exercise, and occupation pointed out in the first indication; and whatever artificial means he may have recourse to, he should every now and then afford nature an opportunity of righting herself. Another method in common use, that of resorting to vegetables and fruit and coarse bread, seldom succeeds in this form of dyspepsia, or does so only temporarily; a mild aperient is on the whole more expedient and less pernicious. The best form of aperient with which we are acquainted is the pulv. aloes comp. (gr. v.) or the following:—R. Pulv. aloes spic., pulv. rhei, pulv. g. guaiaci aa ði. Pulv. ipecacuanhæ gr. iv. Ft. pil. xii. Una vel binæ pro re natâ sumendæ. The pil. galban. comp., the pil. scillæ comp. may be sometimes advantageously substituted for the guaiacum. From five to ten grains of the inspissated residuum of the evaporated decoct. aloes comp. prepared with carbonate of soda instead of potass, or of the baume de vie, affords a mild and easy aperient.

The physician should be economical of his means, and not expend his resources unnecessarily. By this precaution he will both spare the power of the organ and of the remedy.

* Celsus.

If the habitual use of aperients is established, their power must be increased, and at last even strong remedies fail in their effect. The limitation of Celsus, with regard to aperients, is consistent with his wonted prudence; "dum et modo et non nisi quum opus est adhibeatur;" and his reason in accordance with daily observation, "assuescit enim non ali corpus, et ob hoc infirmum erit." This morbid condition will be also corrected by the means used for invigorating the function of the stomach itself. The restoration, however, of the natural relation of the stomach and bowels often suffices to restore the healthy action of the stomach and of the whole function of digestion.

b. The equilibrium of supply and waste of the body may become deranged through inactivity of the excretory organs, a common effect of sedentary and indolent habits, and not always removed upon changing them. The bowels, the skin, and the kidneys may become torpid in their action; the effete parts not being carried off, the process of nutrition flags, and the digestion fails; a stagnation takes place in the extreme vessels, the whole reproductive processes go on sluggishly, or are entirely at a stand, and the stomach in this way loses its stimulus and impulse. This state is to be corrected by giving activity to the excretory organs; and it is a method of restoring the equilibrium often had recourse to, but ought only to be used when the foregoing methods fail; for it is neither so safe, so salutary, nor so permanent as increased exercise and diminished diet. We have frequent instances of its efficacy in the use of alterative remedies, as is shewn in the vigour of nutrition which sometimes follows a course of mercury, or a course of alterative mineral waters. When expedient to be used, a continued course of alterative saline purging affords the best means of effecting it, and most efficiently the mineral waters of Carlsbad or Marienbad.

Besides these means of restoring the desired healthy equilibrium of supply and waste, it has been observed that the same may be temporarily obtained by diminishing the volume of the circulating fluid; and on this principle many cases of this form of dyspepsia, originating in a bloated or plethoric state of the system, have received considerable relief by letting blood. It is a plan well to know, but seldom to be followed.

c. The morbid condition of the stomach which constitutes *atonic gastric dyspepsia*, may be corrected, and the tone of the organ restored, either directly by means applied to the stomach, or indirectly by means acting upon the system at large.

1. Of the direct means which have the power of rousing and invigorating the stomach, in our opinion wine in moderate quantity is not only the most grateful but the most useful. The dry wines are to be preferred, as pale old sherry, diluted with equal parts of water, or old port wine and water, good claret, or white hermitage, sauterne, or hock. Some persons find a little brandy and water agree better than any kind of wine. It is sometimes of advan-

tage to administer these stimulants very cold or very warm, but never of a tepid temperature.

The medicines comprehended in the list of bitters, tonics, and astringents, have also, in a certain degree, the power of correcting the relaxed state of the stomach. But their power in this respect has been very much overrated, which has led to their abuse, and to the exclusion of more rational and successful means. According to our experience the following are the medicines of this nature best suited to this disease:—lime-water, alone or mixed with some aromatic or carminative water (the distilled water of orange flowers best conceals its taste); the infusions of calumba, chamomile, cascarrilla, orange-peel, or wormwood, alone, or in combination with carbonate of soda, or ammonia; camphor julap, mineral acids, the acid. sulphur. aromat., the diluted sulphuric acid combined with tincture of hops, or tincture of cardamoms; the phosphoric acid in the same way; the metallic tonics, as the tr. muriatis ferri alone, or in infusion of quassia, the subnitrate of bismuth, or the sulphate of zinc.

Of all the remedies of this description the best are the carbonated chalybeate waters, as those of Spa, Pyrmont, Swalbach, and Eger, on the continent, or their imitations so accurately and scientifically prepared by Dr. Struve at Brighton; or those of Tunbridge Wells. In administering these remedies, it ought not to be forgotten that they are contra-indicated if any derangement of the biliary secretion be present.

The intention of this indication is sometimes more safely and completely fulfilled by combining tonics with aperients, as the powder of calumba with rhubarb and carbonate of soda, sulphate of iron with extract of aloes, subnitrate of bismuth with rhubarb and aloes, the sulphate of quinine with aloes, or extract of colocynth.

The stomach may also be acted upon by external local applications, as by warm stimulating plasters, but more efficiently by the cold douche to the region of the stomach, or to the back opposite to the stomach. The ancients held this remedy, to which they gave the name of *cataclysmus*, in high estimation.* They used chiefly the cold douche, either of sea-water or of mineral springs. Those of Cutilia, Simbruinum, and Nepete, were most in repute, now almost unknown; for the modern Italians prefer the indulgence of the thermal springs, which they use in precisely the same manner.

2. The indirect means of restoring the tone of the stomach consist in avoiding all the causes which tend to weaken, enervate, or exhaust the body or mind, as over-indulgence in sleep, and hot beds, lustful excesses, hot and ill-ventilated apartments, moist climates, the too frequent use of the warm bath; and

correcting or removing those habits or states of body which have the same effect, as leucorrhœa, or other weakening discharges; habitual venesections, chlorosis, and such-like diseases. The hours of sleep should be diminished; the patient should retire to bed early, and should rise in the morning soon after waking; he should sleep upon a mattress, in a bed without curtains, and should be careful that his chamber is well ventilated and dry.

The clothing of the body should be rather cool than warm, but sufficient to prevent the feeling of coldness; without being oppressive it should be sufficient to protect the patient from the inclemencies of the weather. It will be at all times desirable that the lower extremities should be kept in a state agreeably warm.

If the patient have the power, he should select for his residence a dry climate, either cold or mild, such as is found in England at Brighton, Tunbridge Wells, Clifton or Malvern; in Switzerland, at Berne or Lausanne; in the south of Europe, at Nice, Genoa, and Naples. He should inhabit airy and well exposed apartments fronting the south east, so as to have the forenoon sun, and should be cautious not to dwell near rivers and marshes.*

Much of the baneful effects of prisons, manufactories, and places of a like kind, might be corrected by proper ventilation, by the use of the *cheminée d'appel* and similar expedients.

The patient should pay particular regard to cleanliness of his person; he should use freely the ablution of cold water, sometimes to the whole, sometimes to parts, of the body; he should sponge the body every morning for a considerable part of the year with cold vinegar and water, or salt and water, much used by the ancient physicians under the name of *ψυχρολουσία*—*frigidi consuetudo lavacri*—and should afterwards rub the body well with a coarse towel; at another period he may use the shower-bath, the cold sea plunging-bath, or the cold fresh-water bath, or exercise himself in swimming; and when none of these means can be used, he should not omit dry friction of the body with the flesh-brush or a flannel glove, a salutary exercise for the indolent, and a useful substitute for it in the convalescent, or those who have not the benefit of locomotive exercise. The patient should pass much time in the open air; he should change his air from the town to the country, from the plain to the mountain, from the sea-side to the inland parts;† or he may find a continued change by a well-planned, not hurried, tour, the most effectual. Of exercise as an alternative we have already spoken; as a tonic it is not less to be regarded; and to both these means—air and exercise—respiration and perspiration—we agree with Aretæus in

* *Habitare vero ædificio lucido perfatum æstivum, hibernum solem habente, cavere meridianum solem, matutinum et vespertinum frigus itemque auras fluminum atque stagnorum—ne modo frigus, modo calor noceat.*—*Celsus*.—See also *Dr. Clark's Treatise on Climate*.

† *Adhibita mutatione longâ, terrenâ et maritimâ.*—*Celsus*.

* *Hinc perfundi frigida, atque in eadem nature, canalibus ejusdem subjicere stomachum ipsum, et magis etiam a scapulis, id quod contra stomachum est.*—*Celsus*. *Ægrotante maritimæ natatione exercendi atque cataclysmo, hoc est, aquarum illusione, suppositis partibus.*—*Cæl. Aur.*

granting a peptic power greater than medicine.*

We must bring our method of curing this form of dyspepsia to a conclusion with observing that though complete success is only to be expected from a steady perseverance, it will not be so readily obtained by strict and undeviating monotony. No regimen of the body is perfect which does not admit of a change; no method is complete which does not leave room for variety. It is the nature of the body as well as of the mind to desire and require novelty. The same diet long-continued becomes loathsome, the same exercise irksome, the same occupation uninteresting, the same medicine inert and powerless. The very disease we are endeavouring to cure may in our opinion be induced by too strict an adherence to one regimen long-continued. "Quod enim consuetudinem est, nocet, seu molle, seu durum est." It is, therefore, the duty of the physician to be well stored with a diversity of means equivalent, but not identical, all capable of effecting the same object, by whose changes, substitutions, and modifications, he may keep alive the languishing resources of the body, drawing a lesson from the wisdom of nature, which has provided us with such an ample variety, that every year hath its own peculiar character, every season its food, every day its weather, every hour its temperature, and yet all are uniform, consonant, consistent, but subservient. And so our methods should be diversified in their details and particulars, but uniform in their general plan and spirit. In this principle of variety, this law of our constitution, are explained the astonishing effects of change of air and climate in the disease of which we have been treating, in which is comprehended the change of all our habits, of diet, exercise, and occupation.

But our advocacy of variety in means and method, is not opposed to perseverance in a plan of regimen, but in support of it, the most efficient way of giving it the permanency of habit and success; and even after success, neither may the regimen be relinquished. "Illud quoque in omnibus stomachi vitis præcipiendum est, ut quo modo se quisque refecerit, eodem sanus utatur; nam reddit huic imbecillitas sua, nisi iisdem defenditur bona valetudo, quibus reddita est."†

II.—*Inflammatory gastric dyspepsia.*

Synonyms.—Stomachi æstus et inflammatio, *Cels.*; passio stomachica stricturæ, et cynanche stomatica, *Cal. Aurel. et Method.*; stomachi adstrictio, *Ætius*; cardiagia inflammatoria, et à veneno, gastrodynia adstringens, pyrosis à phlogosi, et Suecica, et anorexia canicularis, hypochondriasis sanguinea et algida, *Sawag.*; Gastritis erythematica, *Cullen*; Gastrite chronique, *Broussais*.

General character.—Painful digestion, sense of heat, tenderness, or pain at the epigastrium, increased upon taking food, or on pressure;

thirst; tongue more or less of a bright red colour, sometimes brownish red, sometimes dry, glossy, and adhesive; taste saltish or alkaline, occasionally like that of blood; bowels generally confined; urine high-coloured; skin dry, occasionally profuse, partial sweats, chiefly in the direction of the extensor muscles; temperature of the trunk increased, of the extremities diminished, except occasionally in the palms of the hands and soles of the feet, which, especially at night, are frequently dry, hot, and burning; aggravation of the symptoms under the use of stimulants or irritating ingesta.

Forms of the disease.—As this disease may present itself in different degrees of intensity, the symptoms are liable to a corresponding variation.

In its lowest degree it is not manifested by loss of appetite, but by increase of thirst, particularly during the night, by increased heat of the skin, flushing of the face, and redness of the conjunctiva, particularly after meals, by disturbed sleep, unpleasant dreams, and by the patient awaking wearied and unrefreshed. The tongue on its anterior half is of a red colour, brighter than natural, often by superficial observers mistaken for a clean tongue; it is seldom dry except during sleep, but soon dries on exposure, and is generally found in this state on awaking; sometimes there is an increased flow of saliva, particularly during sleep, sufficient to leave large stains upon the pillow. When the stomach is loaded with crudities, the tongue is covered with a brownish yellow fur towards its base. The lips are generally dry, and of a glossy red colour, the fauces dry, flushed, or erythematous. The bowels are confined, only dry scanty stools being voided; the urine is scanty, but clear and high-coloured; if any sediment be deposited, it is small in quantity, forming a thin lateritious coating on the bottom of the vessel. The pulse is somewhat harder, more contracted, but seldom much accelerated except during digestion. Contemporaneous with these may exist various secondary symptoms, such as a painful sensation of tension in the head, increased on motion and after eating, or a painful pulsating tension, sometimes a sense of fullness; pain between the scapulæ,* pain of the left side, left shoulder, or left arm, and sometimes local pains in various parts of the body, often felt most acutely on awaking; eruptions of the skin, chiefly lichen, erythema, urticaria, psoriasis, and pityriasis.

In a more advanced stage of the complaint the patient begins to refer his sufferings to the seat of his disorder. He complains of a burning pain at the pit of the stomach, which is much increased upon pressure, and after taking food; or of a sensation of oppression at the stomach, with great uneasiness and discomfort during the digestion of his food, which is generally also accompanied with flushing of the face, acceleration of the pulse, and frequently a tense pulsating headach. If the appetite is not impaired, it is sooner satisfied, and taking food

* Έχει γάρ τι ἡ διαπνοὴ καὶ ἡ ἀναπνοὴ τοιοῦτε φάρμακον πεπτηρίων. *De Cur. Mor. Diut. lib. i. cap. 7.*
† *Celsus.*

* Dolor inter pales tenens.—*Cæl. Aur.*

sometimes causes nausea. There is considerable thirst; the face is red and swollen, the eyes are red, the lips red and parched, sometimes blistered and swollen; the tongue is either of a bright glossy red, sometimes smooth, having the papillæ obliterated, disposed to be dry and adhesive when touched, or of a brownish red colour, or presenting a red ground covered with a thin film of the colour of coffee; small vesications or ulcerations are common upon the tongue, upon the inside of the lips and cheeks, and the mouth generally, which is also redder than natural. The fauces are also red, presenting an erythematous blush; they are generally dry, and frequently the seat of ulcerations. The taste is saltish or alkaline, frequently corresponding precisely to that produced by nitrate of potass; there is also very often a sensation of heat or of scalding at the point of the tongue, such as follows the taking very hot soup. The bowels are constipated, the urine is scanty and of a high colour; the skin dry and harsh, except during sleep, when the patient is sometimes bathed in a heavy transient sweat; the pulse is now permanently quicker than natural, small and contracted, but always quicker and stronger during the process of digestion; the temperature of the body is increased, and the patient complains of burning of the palms of the hands and soles of the feet at night; the sleep is disturbed by painful or unpleasant dreams.

The preceding symptoms, the constant signs of the disease, may be obscured or thrown into the shade by some of the more prominent secondary affections, often the chief subject of the patient's suffering and complaint, and of the physician's attention. The principal of these are headach, a tense splitting headach, increased by motion, by stooping or eating, sometimes deep pains plunging through the head; these are accompanied with a morbidly increased sensibility to light, sound, and all impressions; pain in the left side, in the left hypochondrium extending to the shoulder and arm, pain of the back between the scapulæ, particularly severe on awaking; strong and painful pulsation of the heart, increased in impulse, bearing all the appearance of hypertrophy of the ventricles; inflammation of the eyes or eyelids; soreness, redness, and ulceration of the membrane of the nose; eruptions of the skin, chiefly scaly and exanthematous; suppression of the menstrual function for a time, not unfrequently followed by increased menstruation. With these are conjoined more or less peevishness of temper, irritability of feeling, sullen oppression of spirits, anxiety or restlessness of disposition, all strongly though not elegantly expressed in the words of Cælius Aurelianus; "*animi angustia, jactatio, anxietas, sine concatenatio mentis et desponsio.*"

In a more acute degree of the complaint there is a total loss of appetite, or disgust for food, which on being swallowed causes nausea or is instantly vomited. There is an indistinct dull pain across the pit of the stomach, or a sensation of constriction as if something were

tied tightly across it. The pain is increased on pressure, and sometimes a strong palpitation is felt at the same time. Frequently the pain is felt more in the chest, or the patient complains more of darting pains under the breast, which, being accompanied by a hard dry cough, bears all the appearance of, and is not unfrequently mistaken for, a pulmonary affection, but which may be easily distinguished from it by the cough being always excited by stimulating ingesta, by its returning in paroxysms, by the accompanying state of the tongue, and by the general complexion of the disease. The features are drawn and dejected, the face flushed, and the forehead moist and clammy; the lips are red, the conjunctiva injected, and the eyes prominent. There is considerable thirst; the tongue is dry and parched, sometimes hard and scabrous; it is generally of a brick-red colour, or it is covered with a thin brownish mucous crust; sometimes it presents the appearance of raw flesh, and has been not inaptly compared to a beefsteak or cleanly dissected muscle. If crudities be present in the stomach, which is, however, seldom the case, or if a saburral be added to an inflammatory state of the mucous membranes, the root of the tongue is loaded with a yellowish white fur, whilst its point and edges are of a bright red colour, or the papillæ are prominent, projecting through the fur; the breath is fetid and the taste bitter. In this state only are there ever acid, nidorous, or fetid eructations. The throat is sore, the fauces are erythematous, and, together with the inside of the mouth, frequently become aphthous. Sometimes the tongue is of a dark red colour, resembling the lees of wine, occasionally as dark as logwood. This colour indicates the co-existence of congestion and plethora of the abdominal circulation. The bowels are constipated, but to this state diarrhoea is apt to succeed as the disease continues. The urine is high-coloured; the skin dry, harsh, and flaccid, except during sleep, or while digestion is in progress, when there are frequently heavy, partial, unsatisfactory sweats. The pulse is quick, hard, and small. In the evening and during sleep there is generally an exacerbation of all the symptoms, marked by agitation and restlessness.

There is also a more chronic form of this complaint, which either arises more gradually, or into which the states we have just been describing may have subsided. It is marked by great uncertainty of appetite, sometimes impaired, sometimes morbidly increased, a sensation of heat at the pit of the stomach, sometimes likened to the feeling of a burning coal placed there, or there is a distressing sensation of craving, sinking, or indescribable anxiety. The patient is generally much tormented with flatulence and the symptoms to which it gives rise, a sensation of choking, anxiety, restlessness, and hiccup; and he sometimes suffers much from pulsation at the præcordia, from spasmodic pains in the epigastric and left hypochondriac regions, or there may be a violent pain at the epigastrium extending through the

left hypochondrium and left shoulder; frequently there is a sense of heat internally when the surface is cold, not inaptly termed by the common people an *inward fever*. All the symptoms are much increased by taking food, even the mildest, so much so that patients are afraid of taking food on account of the uneasiness produced by it, from a feeling as if the stomach were incapable of holding anything beyond the smallest quantity. When the stomach is empty, some patients are entirely free from complaint. The bowels are costive, the urine scanty and high-coloured; the tongue is moist and clean, but redder than natural, generally broken by sulci and studded with large developed papillæ; sometimes it is covered with a thin, milky, white fur, through which the papillæ project; the gums are often red, swollen, and spongy, and there is often a taste of salt, of alkali, or of blood in the mouth; sometimes the tongue presents a dry and glazed appearance, with insatiable thirst, and a dry parched state of the mouth; sometimes there is a raw and tender state of the mouth and throat, with uneasiness in swallowing; or there is a sense of burning in the mouth and throat, with hysterical constriction, pain and soreness in the course of the œsophagus. The pulse is small and feeble, and quicker than natural; the skin is dry, rough, shrivelled, flaccid, and sometimes at length almost scaly; the nails become dry and brittle, and often curved; the hair is parched, and inclined to stand on end, and the whole surface is cold. The patient is constantly hanging over the fire, and frequently experiences fits of chilliness, approaching to shivering. The feet and hands are either preternaturally hot or cold; there is coldness or a cold torpor of the extremities, with a general sensation of chilliness; extreme morbid sensibility of any change of temperature, so that when the patient gets warm in bed he soon becomes hot and oppressed, the soles of his feet and palms of his hands burn, and he tosses about restless until he breaks out into a strong and heavy sweat. His sleep is interrupted and unrefreshing, and he awakes hot, thirsty, and weary, in a state of confusion of mind.

The ordinary accompaniments of this chronic affection of the mucous membrane of the stomach are great languor and depression, sometimes insupportable, the patient sinking into a state of extreme debility on the least exertion. The body is wan and emaciated, frequently sallow, the temper fretful, anxious, impatient, or dejected; sometimes there is a troublesome cough, dry, or with scanty mucous sputa; or there is dyspnoea, and pain of the chest like pleurisy; and in either case the symptomatic febrile affection approaches so near to hectic, that it is not rarely mistaken for consumption; sometimes there is palpitation and other irregular actions of the heart; sometimes headache, a tense binding pain across the head, vertigo, or tinnitus aurium; sometimes neuralgic pains of the limbs, sometimes osteocopic or painful affections of the periosteum; and

frequently some affection of the skin, chiefly *erysipelas*, *erythema*, *lichen*, *urticaria*, *pityriasis*, *psoriasis*, *alopæcia area*, the head becoming bald in round patches. But whatever be the most prominent secondary affections, the chief subject of the patient's complaint, there is a characteristic colouring common to every one of them,—they entirely engross his thoughts and occupy his attention, unless, which is not rarely the case, his bodily suffering be transformed into, and represented by, some mental hallucination. The patient's mind never turns from his sufferings, or if it does for an instant, it is only to revert to them with increased earnestness; and as the external senses constantly exercised acquire a fine and acute delicacy of sensation, so that they can take cognizance of minute and subtle objects which escape the ordinary sense, so the internal sense, painfully exercised in suffering which occupies his exclusive attention, acquires a keen microscopic power, and a fineness and subtlety of perception, which, surpassing common experience, is classed as partly nervous, partly imaginary, under the term of *hypochondriasis*,—a disease which M. Broussais satisfies himself with explaining as consisting in an excess of gastric susceptibility.

The change which takes place in the process of digestion is also a remarkable feature, which ought not to be omitted in the history of inflammatory dyspepsia. The food seldom runs into fermentation, acid or rancid eructations are rarely observed, and heartburn becomes comparatively rare; so that if the patient have previously suffered from atonic dyspepsia, he will observe that his heartburn has entirely left him. Certain kinds of food also are observed to be more easy of digestion, as farinaceous food, preparations of the fecula of vegetables, vegetable jellies, and mucilages, vegetable acids, and sweet diluents; the fat of meat, even the fat of bacon in moderate quantities, is more easily digested than lean, than animal jellies, than fibrous or albuminous substances, than eggs or milk.

The symptoms of inflammatory dyspepsia are invariably aggravated in spring, the period during which they are most severely felt being from the spring equinox to the summer solstice. They are also exasperated under the use of medicines of a stimulating quality, which can seldom be borne for more than a few days; and the same is observed of any strong purgative, which invariably gives rise to griping, irritation, and general exhaustion.

Causes.—Inflammatory dyspepsia is much influenced by age, sex, temperament, climate, and season. It is frequently met with in youth and early adolescence, but prevails most from the age of twenty to forty. It affects much more the male than the female sex, and chiefly the sanguine and bilious temperaments, people of a bright florid or of a dark complexion, but of a dry hard fibre. It is met with most frequently in hot and in dry climates, but more especially in those subject to an exces-

sive range of temperature. It is frequent in windy situations, in places exposed to dry winds, whether they be hot or cold. European Turkey, Greece, Italy, Spain, and the south-eastern parts of France, are places which unite all the foregoing conditions, for which reason this disease is also endemic in these countries. The Venetian Friuli was the country in which this disease seems first to have arrested the attention of M. Broussais, a country placed pre-eminently in the foregoing predicament. The late Dr. Parry, of Bath, has taken notice of the prevalence on the sea-coast of the morbid condition of the mucous membranes on which this disease depends, an observation which we have had frequent occasion of confirming at Nice, Genoa, Marseilles, and at Brighton, which may account for the indispositions, in common language, the *bilious attacks*, which many persons experience on coming to the sea-side; but we are disposed to think that the sea-air is not the only condition, for we do not recollect to have met with it much on the coast of Devonshire, where we have had equal opportunities of observing it. We must, therefore, limit the observation to the sea-coast in dry climates. Spring, as has been already observed, has great influence in calling forth and in aggravating the complaint: it returns also with the approach of cold in October. It occurs, however, at all seasons, in extremely hot or extremely cold weather, during sharp or long-continued frosts, during the prevalence of dry winds whether hot or cold; hence we find it to prevail in England during the north-east wind, in Provence during the *mistrale*, in Switzerland during the *bise*, and in Italy when the *tramontana* blows. It is met with in every rank of life, in the country as well as the city, in the outdoor peasant as well as in the artisan.

Certain states of body predispose to this disease,—as a state of general vascular plethora, a state of congestion of the abdominal circulation, suppression of the hemorrhoidal flux, suppression of the menstrual discharge, for which reason it is not uncommon in women at the critical term of life, to which we may add protracted atonic dyspepsia, the stomach becoming irritated by the habitual remora of crudities.*

But certain habits of life have the chief influence in inducing this complaint, such as living on dry, heating, and high-seasoned food, the habitual use of ardent spirits, of liqueurs, of punch, and of opium; hence it is the dyspepsia of the dram-drinker and opium-eater, and belongs altogether more to the drunkard than the glutton.

It may, however, independently of all predisposing circumstances, be at any time excited by certain accidental causes; as, for instance, by drinking cold liquids after violent exercise or fatigue, when the body has been cooled by perspiration, as frequently occurs in summer; by any unusual excess in diet or drink, more

especially if the body is in a state of exhaustion; by any accidental indigestion, as from eating mushrooms, cucumbers, some kinds of shell-fish, nuts, and such-like; by change of diet, from a succulent refreshing to a dry heating diet,* as our French and German friends frequently experience on first coming to dwell amongst us; by a change of water from a soft to a hard calcareous water; by fatiguing and forced journeys; by night-watching; and hence it occurs frequently in nurses, or those fatigued by long attention upon sick friends or relatives; by grief, anxiety, sad or depressing passions, or by sudden bursts of passion; by change of air from a heavy dull atmosphere to a clear dry sky, and hence it is, in connection with the influence of sea air, observed in a slight degree amongst our citizens during the first days of their visit to Brighton; by strong and stimulating medicines,† thus we have known it to follow the use of cubebs and copaiba given for gonorrhœa, of Fowler's arsenical solution given for affections of the skin, of strong and irritating purgatives, stomachic medicines, tonic tinctures and elixirs, and irritating vomits, as mustard. It occurs frequently under a course of mercury, when the constitutional action takes place quickly or runs high. It may also accompany catarrh, or be itself an effect of exposure to cold; it succeeds to the imperfect convalescence of gastric fevers, and supervenes on suppressed perspirations, and the repulsion of cutaneous eruptions.

Pathology.—That the form of dyspepsia we have just described proceeds immediately from vascular excitement of the mucous membrane of the stomach, it would be idle to set about proving. It would be superfluous to observe that no other hypothesis will account for the symptoms, or explain the operation of the causes of the disease, when the fact has been directly proved by innumerable dissections.

Whilst many of our predecessors have recognized and distinguished this particular form of disease, some of them have pointed out the morbid condition on which it depends. Thus, though Hippocrates has described it under a false name, he has yet set it apart as a particular form of repletion; whilst Celsus in its name has explained its nature—*stomachi ingens calor—ubi stomachus exestuat*. The Methodists knew the disease under the term of *passio stomachica strictura*, and by their method of cure we may see that they also understood its nature. It was afterwards accurately described by Ætius under the term of *stomachi adstrictio*,‡ and may, indeed, be traced down-

* Ariditate et erethismo ventriculi a defectu potûs aquosi.—*Sawages*.

† Medicaminis insueti potatio.—*Cæl. Aur.*

‡ Molestia inter digerendum, cum alvo constipata, æstu generali maximè vero manuum ac pedum, faciei rubore, pulsu frequenti, aut iuxta quosdam febricula; accidit imperitibus aridam et densam carnem habentibus.—*Lib. iii. Ser. 1. cap. 13.*

* *Magis istam jugis indigestio parat.*—*Cæl. Aur.*

wards under various appellations in the writings of every succeeding physician. In Italy the knowledge of the disease, its nature and its cure, have been handed down by traditional experience, and is now safely deposited in the hands of the vulgar, within the reach and comprehension of every *baglia*. Not to cite unnecessary examples from modern physicians, Sauvages has, under several of his diseases of symptoms, described its form and indicated nature, for his *anorexia biliosa vel canicularis*, his *cardialgia inflammatoria a veneno et sputatoria*, his *pyrosis a phlogosi et Suecica*, and his *gastrodynia adstringens*, not to mention several others, are only so many symptoms of this disease. Under the term *gastritis erythematica* Cullen has recognised this disease, but the false principle of his nosology separated it from dyspepsia; and we can hardly recollect any instance in which false classification has been so detrimental to sound practice, or in which the influence of good and bad classification upon practice is more strikingly illustrated. From the time of Cullen to the time of Broussais, the symptoms of indigestion were considered purely a nervous disease, an adynamic affection, one of deficient vital power. For though Prost* in France, and Parry in England, had, the one by dissections, the other inferentially, arrived at the conclusion that dyspepsia or disordered digestion might arise from an increased vascularity, a morbid fulness of the vessels of the villous coat of the stomach, it was unquestionably the author of the *Histoire des Phlegmasies Chroniques* who led us back to the right point of observation, and who afforded us the means of recognising and distinguishing these affections. His view of the matter has been amply confirmed by succeeding physicians, even by those who have arrived at his conclusions by a different path, by W. Philip, Andral, Louis, Abercrombie, Cooke, not to mention many more. It is probable, that, had Parry not fallen into the error which obscures the merit of Broussais—that of considering this morbid condition as exclusively the proximate cause of every form of dyspepsia—he might have had more influence on the sober minds of his countrymen.

The vascular excitement of the mucous membrane of the stomach occurs in various degrees of intensity, from a state of mere dryness or defective secretion of the membrane, of injection, congestion, or morbid fulness of the vessels, from a state of erethism or increased action, to actual inflammation. And dissection reveals to us that the inflammation of the mucous membrane of the stomach, and so probably the erethism or vascular excitement which is not aggravated to inflammation, may present itself under three varieties; for it may affect the general substance of the mucous membrane, or it may be confined to the villousities which project from its surface, or the follicles which are imbedded in it,—in all

probability giving rise to diversities and modifications of the disease hereafter to be ascertained by closer and finer observation.

In the dyspepsia of the dram-drinker, marked by loss of appetite, by nausea and vomiting when the stomach is empty, and pain at the pit of the stomach, the stomach itself has often been found with a smooth glass-like surface internally, the extremities of the vessels in the villous membrane having been abraded or absorbed.

Inflammation of the mucous membrane of the stomach appears in many cases to commence in a very small and circumscribed portion; its progress seems to be very slow, and it is probable it may continue for a considerable time, and then subside, and again occur after various intervals, until at last it produces some permanent and extensive disease by thickening of the parietes of the stomach, by adhesion to the neighbouring parts, or by ulcerations.

Dr. Cullen observes, "Erythematic inflammations of the stomach are more frequent than those of the phlegmonic kind. It appears at least from dissections, that the stomach has often been affected with inflammation, when neither pain nor pyrexia had before given any notice of it; and such inflammation I apprehend to have been chiefly of the erythematic kind." "This affection of the stomach, viz. inflammation of the mucous membrane, sometimes spreads into the esophagus, and appears in the pharynx, as well as on the whole internal surface of the mouth." "When, therefore," he continues, "an erythematic inflammation affects the mouth and fauces, and when at the same time there shall be in the stomach an unusual sensibility to acrids, with a frequent vomiting, there can be little doubt of the stomach being affected with the same inflammation that has appeared in the fauces. Even when no inflammation appears in the fauces, yet if some degree of pain be left in the stomach, if there be a want of appetite, an anxiety, frequent vomiting, or an unusual sensibility with regard to acrids, some thirst and frequency of pulse, there will be then more room to suspect an erythematic inflammation of the stomach; and we have known such symptoms discover their cause more clearly by the appearance of the inflammation of the fauces or mouth." "The erythematic inflammation," he also observes, "is often disposed to spread from one place to another upon the same surface, and, in doing so, to leave the place it had first occupied. Thus such an inflammation has been known to spread superficially along the whole course of the alimentary canal, occasioning in the intestines diarrhoea, and in the stomach vomiting; the diarrhoea ceasing when the vomitings come on, or the vomitings upon the coming on of the diarrhoea." In the following passage Parry has made a corresponding observation. "In that state of tongue so common in the West Indies, in which the mucous membrane of that and the adjacent parts is affected with

* Prost, Sur la Sensibilité.

chronic inflammation, tending to aphthæ and suppuration, the stomach, apparently by mere extension of disease, suffers all the symptoms of flatus, acidity, &c. which are common to dyspepsia." Broussais has remarked that a contracted state of the stomach and alimentary canal always co-exists with an inflamed state of their mucous surfaces.

Inflammatory dyspepsia occurs frequently as a secondary as well as an idiopathic disease. Hence it appears as a symptom of some essential fevers,* of variola and rubeola, (dyspepsia febrilis); it occurs in the last stage of phthisis pulmonalis, and in many organic diseases; it is frequently symptomatic of inflammation of the mucous membrane of the uterus, particularly that which follows retention of a part of the placenta; it is observed in plethora of the uterine system, and in plethora of the abdominal circulation (*dyspepsia hemorrhoidalis*); and is met with consecutive to extensive burns, and cotemporary and reciprocally with erysipelas, erythema (*dyspepsia metastica*), and several cutaneous diseases; and we have several times found it co-existing with ichthyosis, and that dry impervious state which might be distinguished by the term of *constipation of the skin*.

Method of cure.—I. Instead of exercise, as in the former species, we must here seek for repose of every description,† of mind as well as of body; but as some exercise is desirable for the general health, it must be of the easiest kind, such as gentle sauntering, walking, or the passive exercises of gestation in a carriage, sailing, swinging, rocking, and gentle friction. Instead of a dry diet, consisting chiefly of animal food, we shall find that a liquid diet, bland and farinaceous, small in quantity at a time, from which animal food and all indigestible substances are excluded, is the most to be recommended. The different articles of food comprehended under the saccharine, acidulous, mucilaginous, farinaceous, and feculent, are most easily digested in this morbid condition of the stomach, and therefore their opposite kinds, milk, eggs, cheese, fish, animal food, animal gelatine, the substantial, solid, or fibrous parts of vegetables, and fruits, are to be abstained from. After repose, or rather diminution of labour and exercise, and a refrigerant diet suited in degree and kind to the particular state of the digestive organs, the warm bath may form part of the regimen. It should be used at a temperature from 92° to 96°, from a quarter to half an hour. If the symptoms require, it may be used every day; and it is of more benefit if used continuously, in a course of ten or twelve daily baths, than if taken interruptedly. Under this mode of administration, the tepid bath forms a direct remedy of great efficacy. But the general cure of this morbid condition of the stomach consists in a judicious use of the antiphlogistic

regimen, graduated to the degree of the disease and the strength of the patient.

In the lowest degree of this complaint a change of diet, avoiding stimulating and heating food and drink, abstaining from active exercise, the use of a tepid bath, of some cooling acidulated drink, as lemonade, orangeade, imperial, orgeat, preserving the bowels open by a simple warm-water clyster, and, if necessary, any mild cooling aperient, for which purpose none answers better than manna dissolved in infusion of tamarinds, to which a small dose of some neutral salt may be added, afford all that is requisite for the cure.

In a higher degree of this complaint it may be necessary to have recourse to a regimen more rigidly abstemious, consisting of gruel, arrow-root, whey, sago, blanc-manger of rice, jelly of bread, of Iceland or Irish moss, solution of gum tragacanth acidulated with lemon-juice, taken in small quantities at a time, in order to avoid distention; to prescribe largely acidulated saccharine drinks, as lemonade, cool, cold, or iced, or such bland drinks as orgeat, emulsions, decoction of liquorice, linseed-tea, &c.; to apply leeches or cupping-glasses freely to the epigastrium;* or, which is probably to be preferred, a moderate bleeding from the arm, proportionate to the degree of the disease: if there be signs of plethora or congestion of the abdominal circulation, leeches to the anus; to relieve the bowels by clysters or the mildest aperients, and to solicit the hepatic secretion by small doses of the pil. hydrarg. or pulv. hyd. cum creta given at bed-time, followed in the morning by small doses of castor-oil. The effects of mercurials must be assiduously watched; for in this disease they are apt to act locally on the mucous membrane, and thus affect the mouth, without, however, affecting the system at large. When mercurials are not used, the nitrate of potass may be given in repeated small doses; for this medicine, antimonials, castor-oil, hydrocyanic acid, the vegetable acids and saline medicines, are the means we are acquainted with which possess most eminently the direct power of lowering the vascular excitement of the stomach; and we do not hesitate sometimes to rely upon them in cases where venesection might otherwise be necessary. These means will be assisted, and their operation promoted, by the use of fomentations or emollient cataplasms to the abdomen, and by the daily use of the tepid bath. As the excitement subsides, the patient may gradually return to a better diet, beginning with light broths of veal or chicken, and at last, but more cautiously, solid food.

We are not unaware that the vascular excitement of the mucous membrane of one portion of the alimentary canal may be diminished by causing a determination to and a secretion from another part of it, and that thus the vascular excitement of the stomach may be reduced by a course of purging; but though this method

* In febribus circa ventriculum et fortis æstus et cordis morsus, malum.—*Hipp.*

† Omnifaria requies.—*Cæd. Aur.*

* Cucurbita adjuncta scarificatione, sive hirudinum appositio.—*Cæd. Aur.*

may be frequently successful, it is not rarely prejudicial, sometimes dangerous.

In the chronic form of the complaint great nicety is required in adjusting the cooling treatment to the strength of the patient and the degree of the disease; for if the disease has been of long continuance, the nervous system is generally affected, and tolerates with difficulty the means suited to the relief of the local complaint; and if the depressing means be disproportionate to the degree of the disease, the stomach sinks into the opposite state, atonic dyspepsia supervenes, and the method of treatment is disparaged. This last consequence is more especially apt to occur if the inflammatory have succeeded to the atonic form of dyspepsia. It is on this account necessary to be cautious in the change of diet, and in the gradual withdrawal of stimulus. It may be advisable to continue in moderate quantities, the use of such animal food as is easy of digestion, as light beef-tea or veal-broth, in small quantities at a time, so as to avoid distention, and, by the bye, solid animal food; if not followed by thirst, increased heat, or headach, they are always useful. If the patient have been accustomed to stimulants, they must not be all at once, but gradually withdrawn; for it is an unquestionable fact that a highly morbidly sensitive state of the stomach may be developed, and even a certain degree of inflammation of its mucous membrane may be exasperated, by leaving off an habitual stimulus. The exhibition of medicines and of other directly depressing means must be modified by the same caution. Leeches will be less seldom necessary. Seltzer water, whey, two-milk whey, and goat's whey, may be used as substitutes for the acidulated drinks. The nitrate of potass may be made to be more easily tolerated by the stomach by mixing it with infusion of hop, chamomile, or quassia, to which, if no heat be present, a little tinct. cort. aurant. or tinct. card. comp. or spirit. æth. nitric. may be added. Dr. W. Philip observes that its alterative effect is not impaired by this addition. Or the hydrocyanic acid may be combined with these instead of the nitrate of potass, if there be any painful affection of the stomach. The *vinum seminum colchici* in very small doses has also to a certain degree the same effect. We have also observed that a water-ice eaten very slowly in the evening, instead of tea, is attended with very good effects; and in summer we have known great benefit derived from swallowing slowly and at intervals small pieces of solid ice when the stomach is empty, which, if the stomach can bear it, proves both a tonic and refrigerant.

With this plan of medicinal treatment much advantage may be derived from a diet well-timed and tempered, always varying it a little: as, for instance, animal food at first only on alternate days, afterwards on two succeeding days, and so on, but now and then interposing a day of abstinence. The same observation is also applicable to medicines: a certain change

and variation of several is preferable to a long continuance of any one.

The bowels must be preserved open by the mildest and least irritating remedies. For this purpose clysters are to be preferred; they should consist of simple tepid water, from a pint to a quart, barley-water, gruel, linseed-tea, or such-like, or in smaller quantities with the addition of a little salt, honey, or electuary of senna; sometimes cold spring water is found to answer best. When aperients must be had recourse to, they should be bland and unirritating,—castor-oil, manna, soda with citric acid in effervescence, tartarised soda in infusion of tamarinds, confection of cassia or of senna. Ripe fruits eaten in the morning in considerable quantities have been found to have the effect of mild aperients, and to be at the same time refreshing to the stomach, such as ripe grapes, strawberries, and figs, which we believe to be the full meaning of the *cure des raisins* so much spoken of in Switzerland; but this method requires considerable caution, for if the fruit be not digested, the object is more than frustrated.

In the chronic state of the disease it is generally necessary to promote the secretions of the liver and alimentary canal by very small alterative doses of mild mercurial medicines. They afford valuable assistance to the general principle of treatment; but we must not forget the readiness with which they are apt to affect the mouth. Neither should the morbid condition of the skin which obtains in the chronic form of this disease be allowed to escape the attention of the physician in combining his method of treatment. He should seek not only to relieve its dry, impervious, constipated state by tepid bathing, particularly the tepid sea bath, but he will find it a means of relieving the vascular excitement of the stomach to produce a derivation to the surface by small doses of antimonials, either combined with a little liquor. acet. ammoniac, or with the nitrate of potass, or by giving alone a grain of James's powder every night at bed-time, or the tenth of a grain of tartar emetic three times a day. If much irritability be present, the hyosciamus is usefully combined with the antimonial. The following formula is well adapted to this intention:—*R* Tr. hyosciam. *m* xii. tr. opii. *m* ii. vel. iii. vini ipecac. *m* xx. potassæ nitratis gr. v. aq. flor. aurant. \mathfrak{z} i. fiat haustus h. s. sumendus. The determination to the skin may also in some cases be usefully promoted by the vapour-bath, and by moistening the skin every morning with a lotion of nitro-muriatic acid. The ancients appear to have had this object in view when they recommended the patient to be enveloped in woollen cloths impregnated with sulphur, and in directing friction to be made with nitre and oil.

But we must confess that in the protracted form of this complaint we have observed every object of this method of treatment fulfilled, and all medicinal means far surpassed in efficacy, by a course of mineral waters, such as those of Harrogate at home, and those of

Ems, Vichy, Plombières, and Caunterès abroad. To any of these, however, we should prefer the Kreutzbrunnen of Marienbad. Under its use we have often seen the tongue get cool, clean, smooth, and moist; the irritated papillæ subside; the uneasy sensations at the stomach give way; the skin become soft, smooth, and permeable; the bowels regular; and the healthy function of digestion entirely restored. It should be taken gradually and in small quantities, in repeated doses of three ounces each. It may be taken warm or cold, as most agreeable to the stomach; if it produce distention, the gas should be allowed to escape; if spasm or diarrhœa, it may be diluted with the Kesselbrunnen of Ems.

The same effect is sometimes obtained from a course of goat's whey, taken in considerable quantities in the morning after the manner of a mineral water, a practice which is followed in Wales, and in the highlands of Scotland, but more particularly at Geiss in Switzerland, with the greatest success.

Neither in the acute nor the chronic form of this complaint does our experience lead us to place much confidence in counter-irritants, and we think we have not rarely seen the complaint exasperated under their use. But many physicians, whose opinions deserve the highest consideration, place considerable reliance upon them. They consist of blisters, the tartar emetic ointment, and issues. In the chronic form of the complaint we have certainly known great relief to attend the wearing a large warm plaster over the surface of the stomach, and in very protracted cases we consider it a good preservative from a relapse, from spasmodic pains, &c.

M. Broussais, having observed the frequency of this complaint in the south of Europe, has mentioned a change to a colder climate amongst his means of cure; but our own experience is in favour of a soft climate, if not too cold. In this complaint we have known one season in Devonshire of considerable benefit; on the continent, the climates of Pau in the south west of France, Rome, and Pisa, are chiefly to be preferred. In the harsh, dry, impervious state of the skin, which takes place in the protracted state of this complaint, it is of great service to have an atmosphere and temperature soft, mild, and equable; and this consideration should also suggest the propriety of warm clothing, of rooms of equal temperature, and the occasional use of the tepid bath.

We think it unnecessary to enter into particular directions for mitigating or relieving the painful and distressing symptoms which are occasionally present in this disease, such as vomiting, pyrosis, gastrodynia, flatulence, and the various uneasy sensations felt in the region of the stomach. Their specific treatment is comprehended in the general method of cure; and for the secondary affections which originate in this morbid condition of the stomach, we can safely refer to the separate articles under which each of them will be considered as symptomatic diseases.

II. For the means of preventing the returning of this complaint, and correcting the predisposition of body on which it depends, we beg to refer to our plan of prevention in atonic gastric dyspepsia. With some modifications in the degree of the means suitable to the particular nature of this complaint, it will be found also to be of useful application here, after the morbid condition of the mucous membrane of the stomach has completely subsided.

III.—Irritable gastric dyspepsia.

Synonyms.—*Ἡ στομαχική, Aretæus; καρδιακή διάθεσις, Auct. Græc.*; cardialgia sputatoria; pyrosis vulgaris et a conceptione; gastrodynia atterens, hysterica, periodynia, et a frigore; vomitus nephriticus et hystericus; anorexia melancholica; flatulencia hypochondriaca, *Savvæg.*; anorexia ex desuetudine verneris, *Galen*; gastralgie, *French*; pain of stomach, most felt when it is full, *Pemberton*.

General character.—Pain, uneasiness, uncomfortable or unnatural sensations in the stomach, generally increased on taking food, and during the process of digestion, neither the frequency of the pulse, nor the heat of the surface being at the same time sensibly increased; the pain rather relieved than increased by moderate pressure; appetite variable, seldom much impaired; bowels constipated; stools little altered; urine clear and sufficiently copious; micturition frequent; tongue clean or thinly furred, never thickly coated; temper impatient, restless, and changeable; easily dejected, easily excited; the attention constantly and exclusively fixed upon the uneasy sensations; great variability in the degree and duration of all the symptoms.

Form of disease.—In the slighter degree or earlier stage of this complaint, when the stomach is empty the patient is comparatively free from uneasiness, but on taking food or in the course of digestion various uncomfortable sensations are wont to arise. The patient may feel a sense of choking or constriction in the stomach, as if the progress of the food had been arrested; the throat feels dry, so that it requires an unusual effort to swallow each succeeding mouthful, and after the food has passed down he is disposed frequently to repeat the act of swallowing, as if to relieve the uneasy sensation; without thirst, he continues to sip small quantities of liquid from the same instinctive feeling, or the same sensation leads him to be constantly hawking and spitting, as if he had some foreign substance in the throat. This is sometimes accompanied with dull, indistinct, but anxious pains in the back, between the scapulae, where the patient rubs or strikes himself, or requests some by-stander to hit the seat of the pain, hoping to be relieved thereby. In an aggravated degree the sensation in the stomach amounts to a severe constringing pain, and is attended with nausea, which, extending up the œsophagus, is met by a sensation of very painful constriction and stiffness of the lower jaw, chiefly in the situation of the parotid and submaxillary glands, followed by a copious discharge of a saltish saliva, which generally

affords relief; or all these symptoms are relieved by vomiting, the food being returned very little changed in its appearance, though frequently an hour has expired from the time of taking it: these symptoms together constitute *pyrosis*. Or, instead of constriction, a sensation of heaving or nausea follows the taking of food, which is also occasionally terminated by vomiting. Sometimes it is a sensation of heat or burning, of coldness, sometimes of itching, tickling, or formication; sometimes there is pulsation at the epigastrium, in the hypochondria or abdomen, appearing suddenly, at first violent, and abating gradually, observed by Schmidtman* to be synchronous neither with the pulsation of the heart nor arteries, and occasionally changing place suddenly, even sometimes transferring itself to the extremities. These symptoms are usually accompanied by various degrees of general irritation, by a state of fidgetiness, of restlessness, inquietude, or anxiety. Sometimes the uneasiness is not perceived in, or referred to, the stomach, but is felt sympathetically in some other part of the body. Thus, the patient may complain of a sense of tension, of painful anxiety in the head, or of an acute pungent pain limited to one spot; or the heart may be the seat of similar affections accompanied with palpitation or irregular action, seldom with stronger impulse, with flushing of the face, or quickness of the pulse; or the patient may be seized with fits of hard loud coughing, with convulsive asthma, or spasmodic affections of the muscles of respiration; with cramp of the limbs, spasmodic pain in the uterus, bladder, or urethra; or neuralgic pain in some part of the body, in the uterus, testicles, or rectum; frequently a fit of hysteria, sometimes even symptoms of hysteria in men. Or the patients may feel restless or unquiet, or be seized with a fit of depression, of ungovernable impatience or anxiety. These symptoms generally terminate with digestion, but may be renewed by taking the mildest food. They are usually accompanied with coldness of the extremities, and early in the attack a discharge of pale limpid urine takes place. The tongue is seldom furred, more usually clean, or it is covered with a thin mucous fur, interrupted by fine waving transverse lines; under actual irritation it is dry without being accompanied by thirst; more generally there is a deficiency of saliva, but the tongue and lips are covered with a white frothy secretion which the patient is ever endeavouring to get rid of by spitting; sometimes it is moist, and the mouth is filled by an unusual flow of saliva; frequently the tongue is thinly furred, as if a fine white gauze were thrown over it; sometimes it is covered with a thin milky white fur, as if the patient had just been drinking milk, and sometimes it is besmeared with a thin frothy mucus. The tongue is generally rather paler than natural, but even

when clean is never of a brighter red colour than in health. It is generally of a dull red, sometimes darker than natural. But the surface of the tongue, whether furred or not, presents the appearance of plush or velvet, which arises from the papillæ being fine and elongated, never either large, tuberosus, and developed, or smooth and obliterated. The bowels are usually costive. The pulse is generally small, feeble, and soft, or small and contracted; it is seldom accelerated, more frequently slower than natural, except under some temporary excitement or agitation, when it is momentarily hurried or irregular. The skin is generally soft, rather glossy, but never dry, harsh, and scaly, as in inflammatory dyspepsia; it is permeable but seldom moist, except sometimes from a sudden breaking out of perspiration on particular parts of the body; perspiration is rather suppressed than obstructed.

In the more protracted forms of this complaint the stomach is rarely free from uneasiness or discomfort of one kind or another; the patient is never unconscious of sensations in the stomach, and to whatever object his attention may be directed, the uneasy feelings of the stomach are mingled in all his perceptions, tinge and darken all his thoughts, thus giving rise to another form of hypochondriasis. These sensations are sometimes that of burning heat, sometimes of icy cold, sometimes of gnawing, grinding, or dragging of the stomach, or of some foreign substance in the stomach, sometimes of emptiness or hollowness, of falling or sinking of the stomach, sometimes of nausea; or there is a constant sense of rising in the throat, sometimes of a round ball, sometimes of an insipid liquid. These uneasy feelings completely take away all power both of mind and body; the spirits become dejected, the body torpid, the limbs powerless,* the mind is prostrate, exclusively fixed upon the uneasy bodily sensation, or ever contemplating the gloomy association or the dark course of thoughts which they call forth;† and the sensibility of the stomach becomes consequently so highly exalted, that patients refer to it all their sensations, as is well expressed in a letter to Pinel from a lady, one of his patients: “Le principe de tous mes maux est dans mon ventre; il est tellement sensible, que peine, douleur, plaisir, en un mot toute espèce d'affections morales, ont là leur principe. Un simple regard désobligeant me blesse cette partie si sensiblement, que toute la machine en est ébranlée. Je pense par le ventre, si je puis m'exprimer ainsi.” Or there may be a feeling of anxiety, of restlessness, or impatience, which can neither be controlled nor overcome, with great nervous susceptibility; the mind is much impaired; the senses become delicate, and the head giddy, the eye

* Summa Observationum medicarum ex Praxi clinica triginta annorum depromptarum. Berlin, 1826.

* ἄσθη, ἀπορίη, θῆψις ἀμαυραὶ, ὥτων ἥχοι, βάρεα κεφαλῆς, νάρκη μελέων, καὶ τὰ γυῖα λύνονται. παλαιὸς ἐι τοῖσι ὑποχονδρίοις. — Aretæus.

† Ἰσχυροὶ, ἐξαχχοί, ἀσθενεῖς, ἐκλυτοί, λειποδρανεῖς, ἀφυχοί, δεῖλοι, ἡτύχοι, ἐξαπίνης δ' ὀργήλοι, κάρτα μεταλλοχολιδεῖς. — Aretæus.

dazzled by the least effort of attention. Sometimes this morbid irritability is most apparent in the vascular system, the pulse being quickened, the heart made to palpitate, the face to flush with a sound of rushing or ringing in the ears. This peculiarity seems frequently to arise from excessive loss of blood. Urticaria, prurigo, stinging or itching of the skin, are not unusual attendants.

These symptoms are occasionally for a time relieved by taking food, and only return as the stomach becomes empty, which acquires a painfully irritable state as the period of taking food is delayed, but they are more commonly aggravated during the process of digestion; and sometimes, in a higher degree of gastric sensibility, severe pain is excited by swallowing the smallest morsel, which is on some occasions instantly rejected. In some cases liquids produce greater uneasiness than solids, and sometimes medicines are the greatest irritants. The symptoms are very much aggravated by purgatives; flatulence, violent palpitations, with a sensation of approaching syncope, and vertiginous feelings in the head, have been observed to arise upon the action of the mildest purgatives; sometimes violent diarrhoea follows the action of a moderate aperient. The pain and uneasy sensations at the stomach are frequently relieved, but sometimes inordinately increased by touch or pressure upon the epigastrium.

In this complaint there is great uncertainty or variability of appetite; sometimes inappetency, even disgust for food, in its most aggravated form; frequently capriciousness, not rarely craving for food; remarkable antipathies and likings for particular kinds of food are frequently observed, and sometimes sudden fits of voraciousness, for such persons generally eat their meals very quickly. There is seldom thirst, but frequently a feeling of dryness in the throat and fauces. The bowels are universally confined, but the fecal evacuation is little altered in quality. The urine is abundant and pale-coloured, and frequently occasions smarting in its passage, its specific gravity being considerable and the urea abundant. The sleep is variable, but seldom refreshing;* patients in this disease are easily put off their sleep; they either sleep heavily, or have difficulty in getting to sleep; if the mind be in the least degree excited or occupied, they pass a wakeful night, the mind being thrown into a state of erethism which they cannot quiet.

Complication of irritable and inflammatory gastric dyspepsia.—When irritable gastric dyspepsia has been of long continuance, when stimulating or irritating remedies have been used for its cure, either heating, stomachic, and antispasmodic medicines, or strong and irritating purgatives, or if the patient have been led by his uneasy sensations into the habit of taking small quantities of ardent spirits or opium, an inflammatory state of the mucous membranes is apt to be superadded to the morbid sensibility and irritability of the stomach, and thus

is formed the most difficult and obstinate form of the disease with which a physician has to contend. The symptoms of both diseases are mixed up together, forming a combination very difficult to unravel, a difficulty much increased by the conflicting evidence which the *juvantia* and *ludentia* afford. The tongue affords the most distinct indication; it is red along its margin, frequently having round spots or points of a darker red interspersed; it is little furred, or has a brownish slimy fur; small ulcerations occur upon the tongue, as likewise upon the inside of the mouth. This appearance, united with symptoms of great nervous irritability, always indicates the combination of both morbid conditions.

Causes.—The circumstances capable of inducing irritable dyspepsia are, either such as act directly or locally upon the stomach, or such as influence the stomach indirectly by acting upon the general system, but the coincidence of causes belonging to both these classes, has the most powerful influence in determining irritable gastric dyspepsia.

To the first description belong the habitual remora of crudities in the stomach, and therefore, in certain temperaments and under the modifying influence of more general causes, irritable not rarely succeeds to atonic dyspepsia; living upon hard, poor, and indigestible kinds of food, not suited to the nature of the body. From this cause proceeds the dyspepsia which afflicts the Irish poor, a great portion of whom live entirely on the potatoe, without milk, butter, or any kind of condiment; and many of the peasants of Scotland, highland and lowland, too strictly confined to the oaten bread; which accounts for the prevalence of pyrosis in these countries; and to a deficiency of quantity and an unnatural quality of food is no doubt owing much of the dyspepsia of the poor in large cities, where it has been known that families have subsisted for a time on the rind of potatoes, and every description of poor and loathsome food;* men in the centre of civilization experiencing all the uncertainty of subsistence which belongs to savage life, without the habits which give them strength to sustain it. Other causes are, change from a stimulating, nutritious diet, to one of a poor cold nature; leaving off any accustomed stimulus, as opium; a certain tenderness (*teneritudo*), delicacy, or partial irritability of the stomach, sometimes inherited, but also the consequence of over care and restriction in the choice of food;† abstinence and prolonged fasts, hence dyspepsia is a frequent consequence of the strict observance of the Catholic fasts, and hence Pinel numbers among the causes of dyspepsia the abstinence of the Bramins, of the Fakirs, and

* *Ευνήδες δὲ καὶ τοῖς ὑπὸ τε ἀνδραγαθίας ἐκδεδητημένοις λεπτῇ καὶ σκληροτέρῃ διαίτῃ.*—Aretaeus.

† Multi ceteroquin sani et robusti parèe atque timide cibum sumunt ob metum ne in cruditate et exinde morbos delabunt cum ob illum ipsum timorem et vanam imaginationem non solum exiguum illum cibum malè digerunt sed ob hoc in morbos incidunt.—Baglivì.

* Οὐχ ὕπνου ἀτρεκέϊ.—Aretaeus.

the ancient anchorites of the Thebaid. Certain acrid and irritating ingesta, as the habitual use of mercurial preparations, sometimes irritating purgatives, very strong green tea, and such like.

The causes of the second description are a delicate, irritable, nervous temperament, hereditary or acquired; irritability of mind, usually the consequence of moral causes, as of anxiety, vexation, envy, jealousy, nostalgia, contrarities, reverses of fortune, over-indulgence in tender feelings, nourishing a delicate sensibility, and avoiding too carefully the ordinary rubs of life. Baglivi says, "*Patres familiaris et rei familiaris curâ distenti aut in dignitate fuerint constituti, aut in aulâ vivant.*" He might also have added the mothers of families, for we are not acquainted with a more general cause of this disease than the anxieties of mothers watching over the health and education of their children, their own health at the same time being frequently undermined by diseases peculiar to their sex. We may add causes which disturb, extremely exhaust, or debilitate the body, as concussion of the brain, repeated venesections inopportunistically employed; protracted and exhausting hemorrhages, weakening discharges; all which causes are more powerfully felt if the stomach be irritated by indigestible food or exciting physic; climates and season of year, frequent and sudden variations of temperature, to which probably may be attributed the colic of Madrid, nearly related to this disease, and also the prevalence of this disease in the spring in our own country.

The morbid irritability of the stomach may be also sympathetically induced from its consent with other organs. This affords a common source of the disease in the female sex, in whom it is often induced by an irritable or painful state of the womb, as occurs in dysmenorrhœa, in some forms of menorrhagia, in leucorrhœa, pregnancy, lactation, and hysteria. But the same effects may follow an irritable or painful performance of the function of other organs, as is exemplified in a painful state of the kidneys and ureters, in stricture of the urethra, in an irritable state of the testicles, and in other painful local complaints.

Pathology.—Though the ancients did not generalize the phenomena of this disease under any specific term, they have most accurately described them. Hippocrates has detailed the symptoms in his account of that state of body which the fatigue exceeds the support,—*οἱ πόνος κρατέουσι τῶν σίτων*, and we doubt much whether a more faithful portrait of it is to be found than that left us by Aretæus of his disease—*στομαχικῇ*. The Methodists would seem to have known it under the term *durities stomachi*, a sub-species of their *passio stomachica strictura*. It was very fully described and treated of by Cheyne, was noticed by Tissot, Pommé, and other writers, but most especially by Whytt, who was himself a sufferer from it. The nature of it was very clearly pointed out by Pemberton under the term of "*pain of the stomach increased upon taking food*," as will appear from his own explanation. "The pain

of the stomach, which is most felt when it is full, would appear to arise from irritability of the muscular coat of that organ, and not to be at all connected with the glandular secretions of it; for unless the pain be called forth by taking food, it will rest perfectly at ease. This disease seems particularly to attack chlorotic women and hypochondriacal men; I am, therefore, inclined to believe that it owes its origin to the muscular fibres of the stomach partaking of the general irritability of all muscular parts in an irritable habit; and I think that the advantage derived from the method of treatment hereafter mentioned will add considerable strength to this opinion." In Germany it was very accurately treated of by Schmidtman under the name of one of its symptoms, *cardialgia*,* by which is understood any pain or uneasiness of the stomach, not heartburn, as it is usually translated; in France by Louyer Villermay under that of hypochondriasis, which he considers to depend upon some modification of the organic sensibility of the abdominal viscera, especially of the stomach; and was, lastly, more fully developed by Barras,† he himself having experienced the disease to a deplorable degree. We are indebted to Dr. James Johnson for having recalled the attention of the profession in England to this disease in his able work on the morbid sensibility of the stomach.

They who are practically conversant with the sufferings of the human body, are too well aware that it does, under certain circumstances, assume a morbid condition which supports with difficulty the impressions of all external agents, even the most ordinary, whether their property be to excite, to depress, or otherwise modify the vital powers. This state of body perceives impressions, in kind and degree, not cognizable in the healthy state of sensation, and is excited to action by slight causes, which in the ordinary state of health would have no effect. Persons labouring under this affection are disturbed beyond all measure by the weakest stimulants, and are overwhelmed by a sedative of the lowest powers. In such persons we have known a few grains of nitre to cause fainting, or a severe fit of colic, the loss of a trifling quantity of blood to induce a convulsion, a Plummer's pill to bring on deadly cold sweats, inexpressible agony, and all the threatening symptoms of instant death, a few drops of laudanum to induce convulsive fits and delirium. The phenomena of this morbid state of body have been generalized under the term *irritability*, consisting, as is evident, not only in a morbid sensibility, but also in a morbid susceptibility, or mobility, in some respects the reverse of that of atony, in which both the sensibility and mobility of the body are remarkably diminished, sometimes requiring the most powerful stimulus to call them into action; but both appear in some measure to be connected with a state of

* Op. cit.

† Traité sur les galgries de Paris, 1827.

deficient vital power, from the manner in which they are aggravated, if not produced, by debility and debilitating causes. In this respect, perhaps, their common nature might be acknowledged, whilst their particular character was distinguished, and thus atony might be termed passive debility, debility in repose,—irritability, active debility, debility in action.

This constitution of body may be hereditary or it may be acquired, but the manner in which it is engendered, though well deserving of investigation, has not yet been satisfactorily explained. It seems, however, capable of being produced in the strongest bodies by painful suffering or long-continued strain of body or mind. A painfully sensitive state of any part of the body, permanent or frequently recurring, by which as it were the nervous system is sustained in a constant state of erethism or wakefulness, and by which a second or morbid sensorium becomes by degrees developed, where every sensation is felt or reflected, seems to have the power of inducing this condition of body. The tic douloureux, calculus of the kidneys or bladder, stricture of the urethra, painful menstruation, chronic rheumatism, prurigo, even such insignificant ailments as tooth-ach or painful corns, afford every-day examples of this power. Painful gestation, difficult parturition, afford similar examples, but sometimes rendered more remarkably striking when combined with debilitating causes, as they frequently are, particularly by excessive losses of blood, as in flooding after miscarriages or lying in. But debilitating causes without pain have much less power in inducing this state of body. The most complete anæmia may sometimes be observed without irritability, and we fancy it will be found that the debility has been in the one case induced with pain, and in the other without it. Pain, however, supervening upon a state of debility, affords the combination of circumstances the most powerful in inducing irritability.

In the same manner the affections of the mind most capable of inducing this state of body, are long-continued care and anxiety, expectations deferred, and repeated disappointments, all the feelings usually comprehended under the term vexation, the effects of which, if examined into, will be found to consist in a state of painful consciousness, exactly corresponding to the state of body just described, both agreeing in exciting a constant and continued state of nervous erethism, and in developing a new seat of sensorial power, distinct from that of the common sensorium.

This view of the manner in which irritability is acquired, is amply borne out by the nature of the operation of the causes which are capable of exciting it, whether general or local, to both of which we must refer.

According to the operation of these two kinds of causes, this morbid condition may be general, affecting every organ of the body or it may be local, confining itself to some particular system or to some particular or-

gan. It may commence in some particular organ, and thence propagate itself to the general system, or it may, emanating from the general system, diffuse its influence over the whole body, or, from certain local causes, be concentrated upon particular organs. Instances of the former are afforded by the eye, which sometimes acquires a morbid degree of irritability out of all proportion to the general state. The same may be observed of the womb in painful menstruation, or after frequent miscarriages; of the bladder, which sometimes, without any inflammation, acquires a degree of irritability, rendering it incapable of retaining the smallest quantity of urine; of the urethra, giving rise to painful and spasmodic stricture; and the testes and kidneys, equally susceptible of this state, afford similar examples. The heart and vascular system appear also, from the influence of particular causes, to be sometimes placed exclusively under the influence of this state, as is shewn by the quick, irregular, and easily excitable pulse, the palpitation and disturbed action of the heart, the sudden flushing sometimes of the whole surface, sometimes confined to a small extent. It is not, therefore, to be doubted that the stomach and bowels may be affected in the same manner, and placed in the same morbid condition, consequently giving rise to a corresponding form of dyspepsia.

Nor is it difficult to understand either, how from local causes this state of morbid irritability should be engendered in the stomach, or how any disorder of the digestive function, when the constitution or any particular organ is under the influence of this state of irritability, should, by virtue of the law of consent, assume the form of disease.

When from any cause, as from habitual indigestion, the stomach is kept continually in a state of irritation or erethism by the remora of crudities, it becomes a seat of conscious sensation, to which the attention is continually directed. In consequence of which, as we have already explained, the stomach acquires an acute degree of sensibility like any other sense long exercised under the constant effort of the attention. To use the words of M. Barras, “la sensibilité de l'estomac s'exalte à un point étonnant; d'organique elle devient animale, pour me servir du langage de Bichât. Tout ce qui se passoit dans le principal organe de la digestion, je le sentois comme s'il se fut passé sur l'organe du tact, la présence des alimens y étoit perçue, comme elle auroit été sur la main.” That such is the effect of the remora of crudities we have a strong proof in the parallel case where foreign bodies are lodged in the stomach,* or generated there, as in the case of bezoartic concretions,† or parasitic animals.‡ In all these cases the same

* *Gastrodynia a peregrinis.*

† *Gastrodynia Calculosa, vomitus bezoarticus.—Sawages.*

‡ *Dyspepsia verminosa Cardialgia verminosa, vomitus verminosus, nausea à tania.—Id.*

morbid irritability is developed, giving rise to all the peculiar symptoms which belong to irritable gastric dyspepsia. The following case affords a good illustration. "A man of sixty years of age had for a long time experienced, whenever he took a little nourishment, violent cramps of the stomach, accompanied with a sensation of burning heat in that organ, and with the eructation of liquid so acrid that it ulcerated the pharynx and corroded the enamel of the teeth; to these symptoms were added vomiting, which returned several times in the day, a continual sensation of pressure and of agony at the præcordial region, disgust for food, habitual constipation, almost entire loss of sleep, and at last gradual wasting. One day, in one of his usual efforts of vomiting, a calculus was ejected, which afforded the patient some relief, and the day after a return of the vomiting effected the expulsion of a second. The first of these calculi weighed a drachm, the second half a drachm. A short time after these were ejected, the patient was restored to health."* Similar cases with corresponding results are also to be met with from organic causes, as, for instance, when tumours, fungous, vegetative productions have been found projecting into the stomach, they have been always preceded by the symptoms of irritable dyspepsia; ulcers of the mucous membrane of the stomach, and diminished capacity of this organ, have also been known to give rise to similar symptoms. And to this manner of operation may also be referred all the other local causes of irritable dyspepsia.

Of the secondary origin of irritable gastric dyspepsia, where the disorder of digestion emanates from, or is modified by the irritable state of the constitution, or of some other organ, we have examples of the former kind in concussion of the brain, in nostalgia, in the *cardialgia lactantium*, *anorexia cachectorum*, and *anorexia melancholica* of Sauvages; in the *anorexia exhaustorum*, *dyspepsia cachectica* of Cullen; and of the latter, in the *nausea nephritica*, *vomitum nephriticum*, in the *gastrodynia hysterica* and *chlorotica*, the *nausea* and *vomitum gravidarum*, the *pyrosis a conceptione*, of Sauvages; and in the *dyspepsia nephritica*, *hysterica*, *catamenialis*, *dysmenorrhœa*, *gravidarum*, *chlorotica*, and *hypochondriaca*, of Cullen.

We must also notice in this place a form of secondary dyspepsia arising from spinal irritation, which has been particularly described by Mr. Teale, of Leeds, in his very able and practical work on neuralgia. There can be no doubt that every species of dyspepsia may originate in a morbid state of the spinal marrow; but according to this writer the spinal irritation will be always perceptible on pressing some of the middle or lower dorsal vertebræ, or by tenderness in the neighbourhood of the middle and lower thoracic ganglia. This affords the chief distinction of this variety of dyspepsia, which, with the other secondary forms of dyspepsia, only derives per-

manent relief by the treatment of the primary disease.

Treatment.—The method of cure which experience sanctions is in exact correspondence with the pathological explanation which we have given of the disease. It consists of the following indications—viz. 1, endeavouring to render the function of digestion easy of performance by a selection of food suited to the nature of the disease; 2, correcting the morbid condition of the stomach, either *directly*, by the use of medicines which have the power of modifying its innervation, of diminishing its morbid sensibility and irritability; or *indirectly*, by such means as soothe and assuage the irritability of the whole body; and 3, by restoring the tone of the stomach and of the whole system, by which the morbid condition is not only removed, but its return prevented.

1. The first indication will be fulfilled by a proper regulation of the diet, suited to the sensibility of the stomach, and apportioned to the wants of the body, adjusting it to the exercise of the body and the occupation of the mind.

It may be collected from what has been said, that the waste outruns the supply, that the wear and tear of the body and mind exceeds the ratio of supply; but it would be in vain to think of restoring the equilibrium by increasing the quality or quantity of the nourishment, for the stomach could neither bear it nor appropriate it. It is therefore to be adjusted by diminishing the fatigue of body or the wear of the mind, as either may be the offending habit.

The chief object to be held in view in selecting the diet, is, that it should be of such a nature and in such a quantity as may be digested with the least labour and the least irritation, and such as leaves no indigestible refuse to gall and fret the stomach, thus keeping its sensibility ever awake. What answers this purpose best is a mixed diet, what Cheyne was used to call a *trimming diet*. It consists partly of animal and partly of farinaceous food, neither entirely dry nor entirely fluid or pultaceous, avoiding all those kinds which have been already specified under the treatment of atonic gastric dyspepsia, as universally indigestible. The quantity is also of paramount importance. The meals, of whatever they consist, ought to be very small, but may in proportion be more frequently repeated, it being of the first importance to avoid distention of the stomach. Some of the most aggravated forms of this complaint appear to have been cured by carrying this principle to its full extent. The cases related by Dr. William Hunter* and by Mr. Hey of Leeds were cured by feeding the patients on skimmed milk, given in very minute quantities, one or two table-spoonfuls at a time; and another similar case† was treated successfully by Dr. Barlow of Bath, by restricting his patient to a diet consisting wholly of fresh-made uncompressed curd, of which she took

* Andral, Anat. Path. p. 168.

* Medical Observations and Inquiries, vol. vi.

† Abercrombie, Diseases of the Abdomen, p. 51.

only one tablespoonful at a time, repeating it as often as she found it advisable. And we have known a similar case in which a preparation of the fecula of oats, known in Scotland by the name of *sowens*, in Ireland by that of *flummery*, given in repeated small quantities, proved equally efficacious: milk has been also used in the same way. Such a plan of diet refers, of course, to extreme cases. We have only mentioned these instances for the sake of impressing the importance of small meals. We have found the strictly dry diet invariably difficult of digestion, and would in general recommend to begin dinner by a few spoonfuls of light plain refreshing soup. A very small quantity of properly dressed tender vegetables is admissible. One glass of sherry, or two of claret, Sauterne, hermitage, or hock, or a proportional quantity of brandy and water, may be permitted, or these may be taken alternately with a small quantity of home-brewed beer. The temperature of the diet has also been found of very great consequence. It has sometimes been found that the food eaten perfectly cold has digested easily, when the hot has been immediately rejected, though the reverse is generally the case. It is of the greatest importance in every form of dyspepsia, but most especially in this, to eat deliberately, and to masticate the food with scrupulous care.

Procuring easy and satisfactory relief of the bowels is another means of indirectly relieving the irritability of the stomach. This object ought to be attained by the mildest means, for purgatives frequently disagree, and the milder purgatives act better than the rough or violent ones. When the simple clyster will effect this purpose, it is to be preferred: if not, some mild aloetic pill, similar to the formula already given, or the decoct. aloes comp. are the most suitable. It is sometimes of service to combine the extract of hyoscyamus, sometimes a minute quantity of opium, sometimes the sulphate of quina, and sometimes bismuth or steel, with the aperient.

Fatigue of body is sedulously to be avoided, and when the condition of life imposes labour, it is to be lightened as much as possible. Even for those with whom labour is voluntary, much exercise in this disease is not found advantageous, though dwelling as much as possible in the open air is always to be desired. The exercise should be easy, sauntering, soothing, and amusing, as slow moderate walking upon plain ground, exercise on horseback, or an easy-paced poney, driving in an easy open carriage, boat-sailing, or a sea voyage, if the season permit. Some light amusing game may be added to the exercise, as golf.

2. Some medicines have the power of acting directly upon the nerves of the stomach, and in that way of diminishing their irritability. One of the most powerful of these is the hydrocyanic acid, either as it is prepared, or as it is found in the distilled laurel water. The same power is also possessed by the extract of belladonna, and the nux vomica is used by the peasants of Lapland for their endemic pyrosis. The subnitrate of bismuth, the sulphate of iron, the arsenical solution, and the nitrate of silver,

are also remedies of the same nature, and have been attended sometimes with surprising effects. Camphor, valerian, and the fetid gums, are similar remedies of weaker powers. Their preparations, however, afford useful media for the exhibition of the more powerful medicines. If these medicines do not soon afford some mitigation of the symptoms, they ought to be discontinued. Alkali or alkaline mineral waters have considerable power in soothing the irritation of the stomach, as the liquor potassæ or lime-water, but most especially the Kesselbrunnen of Ems, the Theresienbrunnen of Carlsbad, and the waters of Vichy.

Counter-irritants applied to the epigastrium in obstinate cases have seemed to afford relief, but more permanent benefit has appeared to us to follow the continued use of a warm emollient opiate or Burgundy plaster. The warm douche upon the stomach, as used at the baths of Lucca and at other thermal springs, we have known to be of considerable use in this way.

Relaxation and repose of mind prove frequently of themselves a cure for this complaint, by which the disturbed functions recover themselves; and to a certain degree they are essential to the success of the general plan of treatment. Though we may not have the power of throwing off the burden as we will, much is to be effected by disposing of the mind to it. By a gentle steady effort it may be subdued to a state, if not of ease, certainly of quietude. They who know how to appreciate health will not hesitate to make any sacrifice, and they who cannot or will not make the sacrifice, may still do much to correct their habits. If they cannot have entire relaxation, they may seek to change or interrupt their occupations: "*Levat quoque lassitudinem etiam laboris mutatio.*" And if they cannot conquer the habit which care and anxiety have established, they may obtain much by seducing the mind into other occupations.* "*It is upon this account,*" says Cheyne, "*that I would earnestly recommend to all those afflicted with nervous distempers, always to have some innocent entertaining amusement to employ themselves in for the rest of the day, after they have employed a sufficient time upon exercise, towards the evening, to prepare themselves for the night's rest. It seems to me absolutely impossible, without such help, to keep the mind easy and prevent its wearing out the body as the sword does the scabbard; it is no matter what it is, provided it be but a hobby-horse, and an amusement to stop the current of reflection and intense thinking, which persons of weak nerves are apt to run into. The common division of mankind into quick thinkers, slow thinkers, and no thinkers, is not without foundation in nature and philosophy. Intervals of no thinking or Swiss meditation are necessary for health.*" Under this impression it has often occurred to us that the innocent pastimes of life are very much

* Vita namque tamdiu in perturbatione est, remedia nequicquam proficiunt, et licet ea recipiat, viribus tamen illorum non auscultat.—*Bagliui.*

undervalued, and we have not hesitated to recommend our patients their quiet rubber of whist, a party at piquet, a game at draughts or backgammon, even chess, or any thing by which the mind is amused without being excited; light occupations of the mind which divert the attention without occupying or fatiguing it; light reading, arithmetical calculations, any game where the stake excites no interest: music (*flute-playing*), drawing, embroidery, and every description of handy-work. We have also known the greatest advantage derived from practising some of the mechanical arts; one of the most inveterate cases of irritable dyspepsia we have known was very much alleviated by the patient taking to the employment of turning.

But frequently all these objects are most completely attained by a tour, a sea voyage, a change of air, which, including change of food, of exercise, occupation, and habits, invigorates the body whilst it relaxes the mind.

The general irritability of the body is much diminished by an open dry air, and by dwelling in it as much as possible; by a long sea voyage in severe cases, by the use of the rocking-chair, the rocking-sofa, and by the swing. But the restoration of no function tends so effectually to calm the irritation and repress the jaded fibres of the body as sleep, and we are of opinion that this, which is left to return as an effect of the general improvement, might probably be advantageously solicited and sought for, as a means as well as a consequence of recovery, if possible, by the more natural means, by gentle exercise in the open air, by early hours, by tepid baths, proportioned in duration to the strength of the patient, the warm pediluvium; but if these are not successful, by anodynes, by the acetate or muriate of morphia, or the black drop, judiciously managed, so as not to derange the function of digestion. This object is so important that it is often desirable to give up an hour or two in the middle of the day to sleep. If the tepid bath does not produce headach or sleeplessness, it is always of service; but to the extreme cases of the disease, where the patient's strength is much exhausted, it is not applicable.

The temperature of the body is to be supported by warm clothing; a flannel roller is of great use; and medicines determining to the skin often afford relief, as ipecacuanha or James's powder in small doses, combined with extract of hyoscyamus. The tone of the body will be invigorated, and the morbid irritability directly diminished, by dwelling much in the open air in a dry temperate atmosphere. We are convinced that, besides the influence of change of habit, this is one of the most important effects of passing a winter in the south of Europe. This effect we have known many persons feel most sensibly, saying they felt as if their nerves were loosened and set free—as if they were out of fetters. When the patient's sensibility is not too delicate, the daily cold ablution is of great service; and in a higher degree of strength the shower-bath may be used with advantage.

3. Provided the bowels are properly regulated, and the function of the liver correctly

performed, some tonic medicines may be had recourse to; but if the preceding plan be faithfully executed, their use will be found of secondary importance. Whatever quiets and strengthens is expedient in irritable dyspepsia, and tonics and stimulants often appear to possess a specific effect in subduing irritable action of the nervous system. They consist of the sulphate of quina, which some have administered endermically; steel in its various preparations. Pemberton was in the habit of giving Griffith's green draught. The ferrum ammoniacum is a convenient form, or the vinum ferri. The carbonated chalybeate waters are frequently successful when no official preparation of iron can be borne, chiefly those of Eger, Spa, and Pyrmont. The irritability is also sometimes diminished by a judicious use of stimulants, but it is a practice which demands much judgment and discretion.

The secondary forms of this disease must be treated by a proper consideration of the primary disorder in which they originate; and for the cure of the secondary affections which originate in irritable dyspepsia, we must refer to the separate articles to which they belong. In conclusion we cannot better explain our notion of the principle which ought to preside over the treatment of this disease in all its forms than by quoting the words of Baglivi: "Blandè et leniter tractandi sunt; a nimia remedium copia et vehementia quam maxime abstinendum."

IV.—*Follicular gastric dyspepsia.*

Synonyms.—Stomachi pituita, *Cels.*; rheumatismus vel fluor stomachi, *Cæl. Aur.*; cardilæa, *Plateri*; anorexia pituitosa, vomitus pituitosus, cardialgia bradypeptæ, *Sauvag.*; anorexia humoralis, *Cullen*; catarrhe de l'estomac, *Pinel*; estomac glaireuse, *Fr.*; pain of the stomach, most felt when the stomach is empty, *Pemberton*.

General character.—Pain, nausea, cramp, sensation of gnawing, of weight, or other uneasiness in the stomach, chiefly felt in the morning or when the stomach is empty, and frequently followed by vomiting of an insipid, viscid, subpellucid fluid.†

Form of disease.—This species of dyspepsia is chiefly met with in capricious old people, and in young persons of a cold phlegmatic temperament about the age of puberty. It prevails most in cold and damp climates, and in cold and damp seasons; it is the usual attendant of the winter cough of old age, and frequently supervenes in the course or upon the decline of a catarrh, and is usually relieved in summer and aggravated in winter. It is commonly manifested by pain, a sense of weight, of gnawing, sometimes by craving, or by obtuse spasmodic pain, or other uneasiness, when the stomach is empty; by loss of appe-

* *Doussin*.—*Dubreuil*. Des Glaires, de leurs causes, et de leurs effets. Paris, 1831.

† Est ea quæ a viscosis adiposis, lentis humoribus in stomacho contentis excitatur; quod cognoscitur ex sensu gravitatis in ventriculo, ructibus insipidis, vomitione pituitæ insipidæ glutinosæ, ex assumptis oleosis, pinguibus sensu expletionis.—*Sauvages*.

tite, nausea, and sometimes by vomiting of a transparent ropy tasteless fluid, clear and glairy like the white of an egg, more generally in the morning, but sometimes towards night. The nausea and other uneasy sensations of the stomach are usually very much relieved by the rejection of this fluid, the quantity of which is in some cases very considerable. In a woman mentioned by Andral this discharge amounted to about four pints in the twenty-four hours; and, what is remarkable, she never vomited either food or drink, shewing this fluid to be highly offensive, and a source of irritation to the stomach.* The pain and uneasy feelings of the stomach sometimes assume the form of *pyrosis*, accompanied with a copious flow of saliva, or a continual watering of the mouth, corresponding with nausea, or a sensation of gnawing at the stomach.† Besides these more specific symptoms, this disease is attended by those which are common to the other forms of dyspepsia, by flatulence, by eructations of flatus or fluid, generally insipid, sometimes slightly acid; by oppression at the stomach after eating, although the pain and uneasiness are considerably diminished by taking food. There is a frequent desire to take food, attended with thirst, and as the disease continues, there is also considerable wasting of the flesh. The uneasiness produced by laborious digestion subsides as the process is finished, but before the time of taking food arrives, the stomach becomes irritated by its own secretion, which produces all the inconvenience of a foreign indigestible substance in that organ, such as a sense of sinking, of dragging or trembling of the stomach, of nausea, faintness, gnawing or erosion, which are again for a time relieved by the taking of food.‡

The distension of the stomach by flatus sometimes gives rise to great oppression or anxiety at the stomach, to the same sensation in the breast, and to vertigo and other uneasy feeling in the head, to palpitation or irregular action of the heart, trembling of the knees, and coldness of the feet and legs. These symptoms are generally relieved as the flatus is expelled, which is, however, accomplished with more difficulty in the recumbent posture; if not accomplished, restlessness, agitation, requiring a constant change of posture, frightful dreams, or incubus, are common attendants.

In this form of dyspepsia there is generally some thirst; the tongue is covered with a viscid mucus; sometimes the papillæ only are tipped with a dull white fur, but frequently it presents a continuous white fur and a sodden appearance; under irritation the tongue becomes dry, presenting a shining or glossy appearance, but still continues paler than natural. The bowels are generally confined, and the evacuations scanty; sometimes large quantities of mucus, generally fluid, sometimes concrete, are mixed with them. The urine is

usually high-coloured, seldom sedimentous. Unless there be great debility, the pulse is slow and soft, and the extremities are generally cold.

The sympathetic affections which characterize this form of dyspepsia are, a troublesome cough, with considerable mucous expectoration, which is much increased by taking food, dyspnoea, humoral asthma, and leucorrhœa. It has also appeared to us that *acne*, in some of its forms, is a disease of the skin very frequently connected with this particular derangement of the digestion; and we have had occasion to notice a form of rheumatism, accompanied by palsy of the parts affected, which frequently attends it,—that species which has from some physicians received the name of *paraplexia rheumatica*. Sympathetic headach is less common.

Causes.—The predisposing causes of this disease are a phlegmatic temperament, natural or acquired; the decline of life, that period after the forty-fifth year, the *senium crudum*, green old age, *l'âge de retour* of the French; the latter part of childhood, the period bordering upon puberty, before and after; damp climates, damp seasons, and damp weather; low marshy situations; indolence of body and mind, and sedentary habits. The ancients thought that particular kinds of food, also, favoured this predisposition: “Crassiores autem pituitam faciunt ova sorbilia, alica, oryza, anylum, ptysana, lac, bulbi, omniaque ferè glutinosa.”* Some physicians have also considered it to be more common in great ale-drinkers and smokers.

The exciting causes are accidental indigestions from food of an improper quality, and catarrhal colds.

This disease may succeed to atonic as well as inflammatory dyspepsia, probably presenting in each case a corresponding variety, a circumstance which leads us to doubt whether we are perfectly correct in erecting this form of dyspepsia into a distinct species, and whether it might not have been more so, to have arranged each of their varieties as sub-species respectively of atonic and inflammatory dyspepsia. But not having been able to distinguish these varieties by their proper symptoms, we must leave the task to a better method and a more refining analysis.

Pathology.—This species of dyspepsia was noticed by Hippocrates as a form of repletion, was clearly distinguished by Celsus,† and described by the sect of Methodists as a variety of their *stomachica passio solutionis* under the term *rheumatismus stomachi*, using that term in its etymological sense of fluxion, and not under its modern arbitrary limitation. Under *anorexia pituitosa* and *vomitus pituitosus*, corresponding with the French term *estomac glaireux*, Sauvages has correctly laid down this species of dyspepsia, and Cullen has included it in his local disease of *anorexia humoralis*. We may also find that this form

* Clinique Medicale.

† Oris humectatio nauseabilis cum mordicatione interiorum.—Cæli. Aureli.

‡ Quæ sumpto cibo temporaliter depellitur.—Cæli. Aureli.

* Celsus.

† Interdum stomacho pituita oritur.

of disease (or its appropriate symptoms) has not escaped the observation of most of our best writers; but it was more particularly singled out by Dr. Thomson in the Edinburgh Medical Essays, by the late Dr. Pemberton in his practical work on the diseases of the abdominal viscera; and we are of opinion that the disease to which Daubenton had his attention chiefly directed, was this particular form of dyspepsia.* We form our opinion on this point, however, as much from the nature of his remedy as the description of the disease, for he has indeed only described the symptoms common to slow and laborious digestion, the *concoctio tarda* or *brudypepta* of some authors.

The older physicians attributed this disease to a cacochymy of the fluids by which the cold phlegm becomes predominant, and they thought to explain the disorder by describing it as a fluxion of the degenerated humour to the chylopoietic organs. But there can be little reason to doubt that, however it may be induced, the proximate cause of this disease chiefly consists in a disordered state of the mucous follicles of the stomach, the *glandulae aggregatae et solitariae* of anatomists. The nature of the symptoms will not acknowledge any other cause, and it would be difficult to find any other morbid condition to account for the peculiar matter so frequently vomited. That the disorder of the function of the mucous follicles may be frequently only a part of a more general derangement of the mucous surfaces of the stomach, is highly probable; but that the disorder also frequently predominates in the mucous follicles—nay, is sometimes exclusively confined to them,—we have ample proof in dissection, and it would certainly be highly unphilosophical not to admit it as a morbid condition of the stomach capable of giving rise to its own peculiar form of indigestion.

The disease of the follicles may be simply functional, or it may be organic, and both of these morbid conditions admit of great variety. Dissection shews us that a disordered state of the secretion of the mucous follicles may proceed from very different states of these organs. It may be the consequence of an increased development of the follicles which sometimes succeeds to inflammation, but frequently arises without it. In persons who had formerly suffered from gastric irritation, an increased activity of the secretion, and a remarkable development of the follicles, have been observed. "In opening certain bodies," says Andral, "we are struck with the vast quantity of mucus which sometimes covers the inner surface of the stomach or intestines. This mucus often forms a thick coating extended over a considerable surface. At the first view we might mistake this coating for the mucous membrane itself, which presents a white healthy appearance. Under the covering of mucus, the surface of the mucous membrane may, however, present itself in two very opposite states. Either there

may be found under the mucus a bright redness of the membrane by which it has been produced, the more common state; or it may be found pale and without any trace of redness or injection. For the augmentation of a secretion does not necessarily imply the notion of a sanguineous congestion of the secretory organ."† It is possible, as we have already remarked, that these two opposite pathological states may also afford a distinction of symptoms to be hereafter ascertained by a clearer and finer observation, which may divide this form of dyspepsia into two different varieties, each arranged under their respective species of atonic and inflammatory dyspepsia.

That the accumulated mucus is the proximate cause of much of the painful feelings in this form of dyspepsia may be inferred from the relief which is experienced on its being ejected, as well as from its sometimes being the only thing which is ejected, the food and medicine being constantly retained. "The increased secretion of the glands of the mucous membrane of the stomach," observes Pemberton, "irritates the nerves of the stomach and thus causes pain. When it is secreted in small quantities, it may be so enveloped by any food that is taken as to render it inert; or when it is secreted in larger quantities, it may be thrown up by vomiting after causing violent pain." For being indigestible by the stomach, when it accumulates, as it most frequently does during the night, it becomes a kind of foreign substance, the source of much irritation, giving rise to a great variety of uneasy and painful sensations, and frequently to habitual daily vomiting, a complaint which M. René Prus considers the cause of a considerable number of cases of hypertrophy of the muscular coat of the stomach, frequently mistaken for cancerous degeneration of that organ.

Method of cure.—As in every species of dyspepsia, so in this, the method of treatment must necessarily consist of the following indications:—1. to render the process of digestion as easy as possible by a selection of food proper in kind and quantity, and suited to correct the morbid condition of the stomach: 2. to excite the function of digestion by exercise adapted to the strength and habits of the patient, calling forth the stimulus of demand: 3. to promote the function of digestion by restoring the harmonious action of the different parts of the alimentary canal, chiefly by preserving an open state of the bowels; and 4, to correct the particular morbid condition, the specific and proximate cause of this form of dyspepsia.

1. The patient should in his diet observe a cautious economy of liquids; his meals should consist chiefly of solid food, of the lean of animal food of such kinds as are easy of digestion, avoiding all that is fat, glutinous, and tough. His meat should be thoroughly dressed, never twice cooked, and his food should be taken hot. In general he should avoid fish, fruit, vegetables, cheese, milk, and eggs. Vegetables are at all times to be eaten sparingly; if prepared in the French fashion, they are certainly less un-

* Daubenton on *Ipecacuanha*. Lond. 1806.

† Patholog. Anat.

wholesome; but cabbages, all roots, and all bulbous vegetables, and all of a flatulent nature, are to be strictly forbidden. He should be careful not to drink before his meals; but plain light soup or broth, impregnated with the juice of vegetables, may be permitted in small quantities. Bread should be eaten stale, and the quantity should be limited. Malt liquors of every description are prejudicial, but a glass or two of dry wine, of sherry, sauterne, hock, or white hermitage, or a proportionate quantity of brandy and water may be allowed, and is frequently very useful. For breakfast, coffee is to be preferred to tea; and it is also in this case a good stomachic after dinner. Butter may also be permitted in moderate quantity; but whatever be the diet selected, the rule which is universal in dyspepsia, must not be forgotten—that a small meal of whatever kind is, *cæteris paribus*, more easy of digestion than a bulky one; and that by whatever plan of diet the patient has been restored, he must adhere to it for a considerable time after his recovery.

2. Horse exercise is the most suitable in this species of dyspepsia; but active walking, even to a certain degree of fatigue, sufficient to produce moderate perspiration, is frequently of great service. The exercise of the arms by the dumb bells or fencing, of the chest by singing, reading aloud, or declaiming, is of much importance, and ought to be sedulously persevered in. Great advantage has also been derived from boat-sailing and sea-voyages, whether from exciting vomiting we cannot say; but no description of exercise ought to supersede friction morning and evening, either with the flesh-brush or with a glove made of a piece of coarse blanket; and, for obvious reasons, it is more useful when performed by the patient himself than when administered by an assistant.

3. The best aperients in this disease are the decoct. aloes comp. which is sometimes advantageously combined with lime-water; or pills consisting of equal parts of aloes, rhubarb, calumba, and soap; or equal parts of the pil. rhei comp. and pil. galban. comp. or pil. scill. comp. We have also found the lac sulphuris an aperient well suited to this complaint. The object ought to be to obtain easy, satisfactory, and consistent evacuations, which the lavement alone is seldom able to accomplish; but it may be used to promote the operation of other means.

4. In the early stage of the disease the disordered state of the mucous follicles is sometimes quickly and readily corrected by an emetic, probably by exciting and evacuating their contents. For this purpose ipecacuanha is to be preferred; and, when requisite, it may be rendered more active and efficient by combining it with the acetum scillæ. But though emetics, by stimulating and emulging the follicles, do afford considerable relief, their frequent repetition is not advisable; and in the more advanced state of the disorder, where vomiting becomes sometimes one of the most troublesome accidents of the disease, they cease to be serviceable. It has been found that, if ipecacuanha, instead of being taken in doses

sufficient to excite vomiting, be administered in repeated small doses, it is of much more permanent use. With this view Dr. Thomson* was accustomed to divide a full dose of ipecacuanha into several equal parts, which he directed to be taken in the course of twenty-four hours; and in the same way he was accustomed to divide a full dose of an aperient, (his favourite was the old-fashioned tinct. hieræ picræ, well replaced by our tr. aloes comp.) which he gave in the same way, in separate portions, alternating a course of aperients with a course of emetics. Daubenton used ipecacuanha apparently upon the same principle in much smaller quantities, restricting his dose from a quarter of a grain to two grains, just sufficient to occasion a slight vermicular motion in the stomach, but he only gave it once in the twenty-four hours, in the morning fasting.† Herecommends it to be given in water, wine, jelly, or in a lozenge. It is sometimes conveniently combined with the aperient. Where nausea is easily excited by it, we have been in the habit of uniting it with a little sub-carbonate of ammonia, aromatic powder, cayenne pepper, or sulphate of quina; when flatulence is troublesome, with the pil. galb. comp. or the pil. scill. comp.; and when symptoms of acidity are present, we administer it in lime-water: we have often seen much advantage from modifying its action by such auxiliaries.

The sulphuret of potass in doses from a few grains to half a drachm alone, if the sensibility of the stomach does not forbid it, or combined with subcarbonate of ammonia, bitter extracts, aromatics, carminatives, with rhubarb, aloes, the pil. galb. or pil. scill. comp., as circumstances may indicate, is another remedy appearing to possess a specific action upon the mucous follicles. It is probably from a similar property that the sulphureous waters, as those of Harrowgate, Balaruc, Cauterets, and several others, have been found such efficient remedies in this disease.

Heidler of Marienbad also relates several speedy and perfect cures of this complaint by means of the Kreuzbrunnen mineral water. We have reason also to speak highly of tar water and lime water as valuable correctives of this morbid state of the mucous follicles.

Pemberton placed his chief reliance upon opium in union with astringents. In the incipient stages he was accustomed to give ten grains of kino and half a grain of purified opium, made into two pills, every fourth hour. He preferred kino to any other astringent, because, unless there was diarrhœa, it appeared to have no tendency to confine the bowels. This is not very different from the method of Prus, according to which Andral treated, at La Charité, a man who had for a long time vomited a certain quantity of transparent mucus resembling a strong solution of gum arabic in water. He gave him for a month from one to six grains of the watery extract of opium daily. The vomiting disappeared, and under the influence of this medicine, the ordinary effect of

* Op. cit.

† Op. cit.

which is to disorder the digestion, the function of the stomach was entirely restored.

The good effect of these remedies may be protracted or increased by a suitable use of tonics, either bitters or chalybeates. The vinum absinthii was once a favourite remedy in this complaint. The pil. ferri comp., vinum ferri, tr. murialis ferri, and ferrum ammoniatum are suitable forms of chalybeates, care being taken that the bowels are at the same time preserved in a soluble state. But the chalybeate mineral waters of Eger, Spa, and Pyrmont are much to be preferred to any medicine of the same class.

The morbid condition of the mucous follicles may also be corrected by exciting the action of the skin, by increasing its tone and vigour by friction as already noticed; but also by cold ablation with vinegar and water, or salt and water; by the nitro-muriatic lotion, by cold affusion, or the shower-bath, remedies corresponding to the *ψυχρολουσία* of the ancient Methodists. And in addition to them, if circumstances permit the patient to choose his place of abode, he should seek above all things for a dry air, that of the mountains in summer, and of the sea-side in winter; and to fulfil the last intention, the best climates of which we have experience are Nice, Genoa, and Brighton. But wherever the patient may live, he should as much as possible select the driest situation, where the drainage, natural or artificial, is most perfect.

II. DUODENAL DYSPEPSIA.

Disordered digestion proceeding chiefly from derangement of the functions of the duodenum, and the other small intestines.

To say precisely where duodenal dyspepsia begins, or where gastric dyspepsia ends, would not be an easy matter. Subordinate processes in the performance of a complex function, conspiring for one general effect, the healthy actions of the stomach and duodenum, though different, are not easily to be distinguished; and though in disease their difference becomes more developed and more apparent by their discordance, it is more easy to describe than to mark the line which divides them. Nature indeed never separates things by strong or abrupt lines, though she stamps each with features sufficiently bold and clear to distinguish it from its neighbour. Her system is one continuous tissue of great variety and diversity, in which different parts are united together without sign of interruption or joining. In the coloured spectrum no one can say where one colour ends and where its neighbour begins, yet any one may distinguish its different colours, the violet from the blue, the blue from the green, each from its neighbour, and every one from the other. So in diseases having an affinity, where they approach each other they cannot easily be distinguished, whilst in their general character it would be difficult to mistake them. And, likewise, in the function of digestion, though such is the functional dependence of one part of the alimentary canal upon another, that one being affected speedily induces disorder in the remainder, yet attentive observation will dis-

cover the part primarily and chiefly deranged, the leading features, the permanency of some symptoms, indicating directly the part affected; whilst the more variable and less marked character of other symptoms excludes the derangement of other organs.

General character.—Appetite generally little impaired, frequently keen, sometimes ravenous; the oppression, distention, pain, or other uneasy sensations, the signs of difficult digestion, not referred to the stomach, nor felt soon after taking food, but a considerable time, generally from two to four hours, after a meal; urine sedimentous; fæces more or less unnatural in appearance.

Although Hippocrates had distinguished between gastric and enteric dyspepsia, it would be difficult to single out from amongst the diseases described by the ancient physicians, any precisely corresponding with those of which which we are about to treat, though most of their symptoms might be found in the *ventriculosa passio* and *phagedæna* of Cælius Aurelianus, and in the *morbus atrabiliaris* and *morbus hepaticus* of the Greeks. Amongst modern writers it may be detected under the terms of *intemperies hepatis*,* *infarctus hepatis*,† *dolor hypochondrii*,‡ *hepatalgia*.§ But it was not until a knowledge of the anatomy and functions of the human body directed the researches of the physician, that the symptoms of these disorders began to be classed together, and the diseases to be traced to their seat. Hoffmann,|| who dignified the duodenum with the name of the second stomach, and, because of the secretions poured into it, *ventriculus succentriatus*, commenced this important task, in which he was afterwards followed by Bonnazoli,¶ an academian of Bologna, by the elder Monro,** at a later period by Dr. Claisen,†† and more recently by Dr. Warren;‡‡ but the subject remained incomplete until the very scientific and practical essay of Dr. G. D. Yeats§§ on the diseases of the duodenum, delivered as the Gulstonian lecture for 1817. Availing ourselves of the assistance of our predecessors, we accordingly propose following the same course in treating of *duodenal dyspepsia* as we have attempted with *gastric*, dividing it into species according to the morbid condition of the organ, the essence and proximate cause of the disease. We should therefore have to speak separately of *atonic*, *inflammatory*, *irritable*, and *follicular*, *duodenal dyspepsia*; but the irritable form of the disease we do not profess to have yet ascertained. To the second of these species we propose subjoining a variety

* *Sennertus*, lib. iii. p. 6.

† *Junckeri* tabul. 39.

‡ *Boneti Sepulchret.* tom. ii.

§ *Sawages*—*Morbus est cujus præcipuum symptoma est molesta sensatio, gravativa, tensiva, aut alia quævis in regione hepatis; differt ab hepaticide defectu pyrexia acuta.*

|| *De Duodeno, multorum malorum causâ.* Opera, tom. vi. 1740.

¶ *Transactions of the Academy of Bologna.* 1745.

** *Edinburgh Medical Essays.* 1752.

†† *Sandifort's Thesaur.* tom. iii. 1778.

‡‡ *On Headach,* Medical Transactions.

§§ *Medical Transactions*, vol. vi.

commonly met with in scrofulous habits, which may with propriety be distinguished by the name of *strumous dyspepsia*.

I.—*Atonic duodenal dyspepsia*.

Synonyms.—Hepatalgia infarctus, intemperie frigida; aurigo frigida ab obstructione; gastrodynia biliosa, *Sawages*; chylipoietic disorder, *Abernethy*; bilious dyspepsia, *W. Philip*.

General character.—Sense of weight, fullness, or distension, or a heavy, dull, dragging, pain in the right hypochondrium, felt generally some hours after eating; bowels confined; evacuations unnatural; urine dark-coloured and sedimentous; pulse slower than natural; skin rather sallow, and conjunctiva generally tinged with bile; no fever, but considerable languor and oppression.

Form of disease.—When a person labouring under this disease comes to consult a physician for his complaints, it will seldom be found that he blames the state of the digestive organs, but, on the contrary, his physician will sometimes find him quite unconscious of their being in a disordered state; for his patient will tell him that his appetite never fails him, that he never finds any kind of food disagree with him, and therefore he is quite clear that his digestion has nothing to do with his ailments. He may complain of headach, affecting more particularly the back part of the head; of pain of the back, or under the right scapula; of lumbago, or pains in the joints; of pain or numbness of the right arm; of cough, dyspnoea, languor, loss of strength, or depression of spirits, or of many other similar sympathetic affections, but the disorder of the digestive organs has never drawn his attention. If, however, the physician enters into particulars, he will find that though the appetite be good, the digestion is laborious; that not immediately, but a considerable time after eating, the patient is oppressed, drowsy, and incapable of either mental or bodily exertion, and that he awakes from a nap uneasy, restless, fidgetty, and irritable. This state of general discomfort is frequently attended with a sense of fullness, distention, or weight towards the right side, or with a heavy dull pain felt chiefly in some part of the right hypochondrium. This pain in the right hypochondrium extends sometimes to the back, frequently between the spine and the right scapula, or under the right scapula, or it corresponds with a dull pain felt chiefly at the top of the shoulder, or with numbness or dull pain extending down the right arm to the elbow, wrist, and little finger, more rarely with pain of the right hip, extending down the right leg. Under certain circumstances these symptoms are very much exasperated, and the pain in the right hypochondrium becomes very acute, accompanied with great anxiety or with spasm in the situation of the duodenum, and a sensation of weight in the hypochondrium and loins, amounting to a complete attack of gastrodynia. If the right hypochondrium be examined, more especially if the examination be made when the patient is in the erect posture, a fullness will be perceptible through the whole hypochondrium, more sensi-

bly apparent when compared with the left; sometimes a circumscribed puffiness is perceptible in the site of the duodenum, most particularly just before the cartilage of the eighth rib, in which situation it is observed that pressure is disagreeable, sometimes occasioning a sense of oppression or dyspnoea. This puffiness not unfrequently disappears in a day or two, particularly after free evacuations of the bowels, and then gradually returns, but is sometimes quite stationary, and occasionally so obvious as to be observed through the clothes, more especially in females. On some occasions it is so circumscribed and prominent as to give almost the appearance of a hernia. Such a case we have met in consultation with our amiable and lamented friend, the late Professor Andrea Vaccà, of Pisa, which appeared to derive considerable relief from the pressure of a bandage. Instead of pain or sense of weight in the right hypochondrium, there is occasionally a feeling which conveys the notion of torpor, of stoppage in or dryness of the bowels, as if their contents made no progress downwards, to which frequently corresponds a sensation of fullness in the lower bowels, leading to ineffectual efforts to relieve them, and not rarely spasmodic stricture of the rectum. Or there is soreness or a sense of fullness below the pit of the stomach in the situation of the arch of the colon, but deeper-seated. These affections are disposed to occur in paroxysms, seeming to be connected with the state of digestion, for the symptoms are more or less relieved as the process of digestion is completed, or they are relieved by satisfactory evacuations of the bowels, and relief is even experienced as soon as the upper portion of the bowels is put in motion, often long before an evacuation.

With the above symptoms, distinctly referable to the seat of the disease, or in place of them, the patient may complain of headach, which, generally unaccompanied with nausea, commences with a feeling of uneasiness of the head, with indistinctness of ideas, and disinclination or incapacity for mental exertions, chilliness of the body, coldness and dampness of the hands and feet. The headach itself consists in a pain or dull aching, sometimes of the forehead, but more commonly of the crown or posterior part of the head, which is attended with restlessness, with intolerance of noise, with dazzling or mistiness before the eyes, or with the appearance of various colours or luminous forms. The headach is invariably much aggravated during the period of digestion; sometimes it terminates with the process of digestion in a few hours, but when it has become habitual, it may continue for one or two days. Instead of headach there is sometimes a sense of fullness or of distention of the head without any fixed pain. Vertigo is occasionally the most troublesome symptom, and we have known it to persist uninterruptedly for weeks together; or the patient being seized with temporary loss of consciousness, and of muscular power of the limbs, falls down suddenly without syncope or convulsion. Contractions of the countenance,

rolling of the eyes, cramps or numbness of the limbs, are very common symptoms, and even hysteria, chorea, a fit of epilepsy or apoplexy, are not rarely connected with it. Rheumatic gout, aching pain in the knees and ankles, particularly of the right side, lumbago, pain of the back, especially in the direction of the right kidney, commonly aggravated by the recumbent posture, languor, lassitude, and weakness of the limbs, feeling as if the legs would give way, and sometimes actual paraplegia, are amongst the secondary affections of this disease. Fluttering, irregular action, and sense of distention of the heart, irritation of the larynx or trachea, causing a constant hawking or effort to expectorate, singultus, dyspnea, and even asthma, are not unusual symptoms. A degree of spasm, sometimes stricture with a sense of weight or load about the rectum, spasmodic stricture of the urethra, or difficult micturition, are not rarely observed in this complaint. The various forms of *epheles*, *pityriasis versicolor*, some species of *herpes*, particularly *herpes præputialis* and *circinnatus*, the *impetigo sparsa*, are the diseases of the skin which we have most frequently remarked as connected with this complaint, and their eruption is not rarely attended with relief of the internal disorder. Indolence, sluggishness, listlessness, or indifference of temper, want of the usual distinctness of ideas, a feeling of a cloud over the intellect, loss of memory, confusion of intellect, or oppression of spirits, are characteristic symptoms of this disease.

With more or less of the foregoing symptoms, either directly referable to a deranged state of the digestion, or secondary consequences of it, the appetite is observed to be seldom impaired, but on the contrary soon returns after eating, and even during the period of suffering is often preternaturally increased and voracious, sometimes unusually keen, particularly for food which disagrees, which last proves not seldom a premonitory symptom of an exacerbation of the complaint. The tongue is large, broad, soft, and flaccid, covered with a yellowish white mucous fur towards the root, but moist, slimy, and of a dull red colour towards the point and margin, presenting in general a flabby and sodden appearance. The bowels are costive, more rarely alternating with occasional diarrhoea, and the alvine evacuations when costive are hard, dry, and adust, of a dark brown or dull olive or greenish black colour; if more lax, generally of too light a colour, resembling that of whitish brown paper, of a dull clay or light brownish colour, and devoid of their natural smell; or sometimes yeasty, tape-like, sometimes of a faint yellow colour floating upon the water, giving out an odour like that of saliva, or frequently containing bits of undigested food, uncombined bile, or occasionally consisting chiefly of bile. The urine is unhealthy, not remarkably deficient in quantity, but dark-coloured, of a deep colour like that of mahogany or stale beer, but always sedimentous, either lateritious, or yellow, or cream-coloured, but more generally white and furfuraceous, and so copious as to be thick

throughout like gruel, its surface being generally covered with an oily iridescent film. The pulse is soft, slower than natural, sometimes preternaturally slow or labouring, frequently intermitting or irregular, faint, and fluttering. The skin is dry, dull, flaccid and inelastic, and sallow, and the eye dull and tinged with bile. The feet are habitually cold, the sleep is heavy and unrefreshing; the patient either awakes frequently in the night, or is troubled with disagreeable dreams, and, instead of being refreshed, is oppressed with fatigue in the morning. When the preceding signs of deranged function of the organic system present themselves in combination with some of the complaints or sympathetic affections above specified, there can remain little doubt that they are referable to a deranged state of the duodenum, of which distention or irritation of that intestine is the consequence; and if the preceding signs of derangement of the organic system be present without any complaint, the physician may be sure that a process of disease is in progress which will sooner or later declare itself.

Pathology and causes.—The particular process of the function of digestion, which is more especially deranged by this disorder of the duodenum, is that which, consisting chiefly in the mutual actions and re-actions of the chyme, the bile, and the other intestinal juices, has hence received the name of *encholosis*, and of which the result in health is chilification; and the proximate cause of this derangement is no doubt a pathological condition of the duodenum, consisting partly in deficiency of tone, partly in deficiency of sensibility, from which arises discordant action in relation to the stomach on the one hand, and the intestines on the other. For the duodenum allowing of the accumulation of the chyme, an impediment is opposed to the function of the stomach; the secretion of the bile, depending on the healthy state of the duodenum, is imperfectly solicited, and the peristaltic motion of the intestine being impeded, its discharge into the intestine is obstructed; while the other intestines cease to receive, both in kind and quantity, their natural material of operation. This disordered state of the duodenum rarely, however, originates in itself; from its intermediate position, it is more generally a consequence of an imperfect performance of the function of the stomach or of the large intestines; sometimes, but more rarely, it originates in the liver. If the stomach have not sufficiently subdued the food to a healthy and natural chyme, the duodenum becomes the recipient of unnatural ingesta, unsuited to its particular function, from which disorder must ensue. This state of things appears to us to be more liable to occur to those who, fasting long, are apt to swallow their meals hurriedly, and therefore masticate their food imperfectly, or to those who, ever intent on the business of life, eat, as they think, quickly,—a habit very constantly induced in those who have contracted the pernicious practice of reading or transacting business at their meals. The same effect which arises from the hurried, imperfect mastication

of wholesome victuals, may also be induced by the ingestion of indigestible substances, and therefore the use of such things as the stomach has no power of digesting frequently leads to duodenal dyspepsia, as for instance, nuts or the kernels of fruits, hard indigestible fruits, crude vegetables, the seeds and skins of fruits and vegetables, cherry-stones and similar substances. The same consequence follows for the same reason in some great feeders, whose pylorus allows imperfectly digested food to pass; in this respect some persons, and particularly children, seem to have a great facility.

But a disproportionate quantity of the healthiest chyme poured into the duodenum quicker than the process of *encholosis* can be performed, or than its transmission can take place, must lead to precisely the same result as the passage of chyme imperfectly elaborated. This is the reason that children are proportionately more subject to duodenal dyspepsia than adults; for having in general a good appetite and a powerful gastric digestion, they are wont to eat at all hours and seasons, taking a second meal before the first is digested, so that the duodenum becoming distended with chyme which it cannot transmit, interrupts the discharge of the bile, and accumulation takes place. Of this we have a proof in the crapulous diarrhœa consisting of light-coloured stools which so often ensues. "Children," says Dr. W. Philip, "are still more inclined to this accumulation than adults, most of their complaints being connected with this state of the digestive organs. Of children who are out of health, with the exception of those labouring under contagious diseases, not one in twenty will be found free from more or less of it; and their restoration to health is never permanent till the due action of the first intestine is restored." Precisely the same effect will, in the same manner, be produced by any cause impeding the transmission of the chyme from the duodenum onwards, though it be neither unnatural in quality nor disproportionate in quantity; thus leading to accumulation in the duodenum, to distention, and all the consequences of duodenal dyspepsia. Now this may arise simply from a confined state of the bowels, which, gradually propagated upwards, ends in inducing duodenal dyspepsia; thence we find that healthy people having vigorous powers of stomach, who, from sedentary habits or confining themselves to the passive exercise of a carriage, have their bowels confined, readily become subject to this form of dyspepsia.

The accumulation of fæces in the colon, which in some constitutions, by sympathy, induces atonic gastric dyspepsia, also by its pressure upon the duodenum mechanically interrupts its free action, and prevents it from discharging its contents. And the same consequence results from the postures necessary in certain trades and professions, which have the effect of opposing the proper evacuation of the duodenum. This unhealthy posture is found in the highest degree in shoemakers as they stoop to their last; and we have certainly met with more cases of this disease in persons of

that trade than in any other. Tailors, engravers, and many others whose occupation requires the same posture, suffer in the same manner; literary people and clerks, from bending to the desk or table, frequently suffer from the same affection of the stomach; the stooping of women in their sedentary occupations of needle-work, and still more the pressure of the stays or tight lacing, tend in no slight degree to the same result.

An accumulation of chyme in the duodenum, in whatever way induced, soon lays the foundation of its own increase and continuance, for its immediate effect is to impede or interrupt the proper supply of the bile, either mechanically, (the pressure of the contents of the bowel closing by compression the oblique valvular orifice of the common gall-duct,) or by preventing the proper peristaltic motion of the duodenum which promotes the flow of bile, or lastly by deranging the sympathy of the duodenum and liver, so that the mutual actions and reactions of the bile and chyme—the process of *encholosis*—cannot have place, and the intestine is thus deprived of the natural stimulus for promoting the propulsion of its contents. In this way, therefore, a deficient supply of bile, without either an unhealthy state or an accumulation of chyme, may prove a primary cause of duodenal dyspepsia. Hence this form of dyspepsia is that which is induced by idiopathic icterus, and is reciprocally one of the most ordinary proximate causes of icterus. Or it may be that the sensibility of the duodenum being diminished or otherwise disordered, and the natural sympathetic relation between the liver and duodenum becoming deranged, the bile is not supplied in proper season, or a bile of a less active quality is secreted; for which reason the action of the duodenum begins to languish, and the disposition to accumulate is increased. Thus dyspeptics have for months, even years, a constant accumulation in this intestine; the duodenum never emptying itself thoroughly, a great portion of aliment is retained there beyond the due time, and is not evacuated before a fresh supply from the stomach has laid the foundation of other accumulations, until at last an enlargement evident to the eye as well as the touch often takes place.

This account of the manner in which atonic duodenal dyspepsia is induced, is in perfect accordance with the phenomena, explaining both the origin of the symptoms and the operation of the causes which more especially give rise to it. For we may thus see how the uncomfortable feelings in this form of dyspepsia are chiefly experienced a considerable time after taking food; how the stools present their unnatural appearances, how they are deficient of bile, resembling whitish brown paper, and sometimes as white as pipe-clay—an effect frequently observed to result from the action of opium upon the liver; how the chyme, being prevented from undergoing its proper changes, and accumulating, ferments and gives rise to diarrhœa of light-coloured sour-smelling stools; or how the bile, occasionally suppressed, occasionally accumulated, from time to time is copiously evacuated, and

a bilious diarrhœa is the consequence; how, the secretion of bile being suppressed or impeded, the kidneys assume a vicarious function, and discharging what ought to pass by the liver, give rise to the unhealthy appearance of the urine; how the duodenum, from derangement of its function becoming distended by gas or by the accumulation of chyme, or irritated by food imperfectly digested, or by substances indigestible, may by its extensive nervous connections be the source of all the various sympathetic affections above enumerated; and, finally, how inflammation of its mucous membrane or lesion of its structure may be the result.

The peculiar characters of disorders of the duodenum are well illustrated by a case of organic disease of that intestine related by Dr. Irvine, in the Medical Journal of Philadelphia for August 1824; several others are also upon record.

Treatment.—The morbid condition which constitutes the proximate cause of this disease readily suggests the indications for accomplishing the cure. These are obviously:—1. to afford present relief by unloading the duodenum; 2. to render the function of the duodenum easy of performance, *a.* by a proper regulation of diet, *b.* by proper exercise, *c.* by promoting a healthy secretion of bile, and *d.* by preserving an open state of the bowels; and 3. by seeking to correct the morbid condition of the intestine upon which the disease depends.

1. Unless the accumulation in the duodenum be the consequence of pressure from a loaded state of the colon, it is best evacuated by some aperient; otherwise an active enema affords the most immediate relief. For emptying the duodenum senna is the medicine which deserves the preference, being well fitted to promote the action of that intestine. Dr. Wilson Philip observes that it has appeared more effectually to remove the fulness of the right hypochondrium, when it depends on morbid distention of the duodenum, than any other medicine equally mild in its operation. It is best given in the form of infusion with an equal part of some carminative water or some light bitter infusion, and its action will be rendered more certain and more satisfactory by the addition of a small quantity of tartarised potass or tincture of rhubarb, which has also a tendency to prevent griping; but if this unpleasant effect be much felt, it may be avoided by the addition of a few drops of liquor potassæ, of spiritus ammoniæ aromat. or a small quantity of tr. cardamom. comp. to each dose of the medicine. When there is any disposition to fever, the infus. sennæ comp. of the Edinburgh Pharm. ought to be preferred. It may be combined with manna and tartarized potass. Where senna does not agree, rhubarb is the next best substitute. It may be given in substance in some carminative water combined with sulphate of potass or tartarized soda. For this purpose it is not necessary that the aperient should, according to the prevailing practice, be preceded by a mercurial purgative. Mercurials are more efficient and more necessary after the duodenum has been already

evacuated. The extract of colocynth, combined with extract of hyoscyamus, affords also a purgative adapted to this form of disease:—

R Ext. colocynth. comp.

Ext. hyoscyam. aa. ʒi.

T. fiat pilulæ xii. una vel bina hor. som. sum.

There can be no doubt that the duodenum is also sometimes spontaneously evacuated upwards by vomiting, and under certain circumstances this method may be imitated by art; but in general emetics are found to be of little use, and, failing in the object, are liable to do harm.

2. *a.* In order to lighten the burden of the duodenum, and render its function easy of performance, a careful selection of such articles of food as are generally held to be easy of digestion, and a scrupulous adjustment of the quantity to the powers of digestion, are of all things the most essential. The reader may refer for ample regulations on this head to the regimen of atonic gastric dyspepsia. We shall content ourselves with observing in this place that the patient should eat his meals slowly, and that he should masticate his food with the greatest care. In order to avoid infringing these rules he should endeavour to avoid long fasting, which leads to full meals quickly devoured. It is in this sense only that we can understand the reason of that old man's practice recorded by Lord Bacon in his Essays, who, when asked by what means he had preserved himself to so great an age, answered that he knew no other except that he never waited to eat until he was hungry or to drink until he was thirsty, by which he was able always to make a temperate repast; a rule of great value, provided we do not fall into the opposite extreme of eating too frequently. Small meals, then, eaten slowly and at moderate intervals, is the most comprehensive rule of regimen in this complaint. Patients should endeavour as much as possible to keep their minds disengaged at their meals; for they who are accustomed to read, or have their minds much occupied at table, are apt to eat fast and voraciously, and chew their food imperfectly. The food should be of that description which is entirely digested, and which leaves little excrementitious refuse. It should, therefore, consist chiefly of animal food, of stale bread, or moderate quantities of well boiled rice. Light refreshing broths, which are entirely digested in the stomach, afford occasionally a good form of nourishment in this disease; but they should be taken in moderate quantities, and not every day. Wine in small quantities is useful, but malt liquors are to be renounced.

b. The activity of the function of digestion will be excited by proper exercise of the body carried to a certain degree of fatigue: active walking over uneven ground, coursing, leaping, cricket, fencing, the broad-sword, or dancing, each proportioned to the strength and habits of the patient, are the exercises most to be recommended; reading aloud, declaiming, and singing are also useful. Horse-exercise is also well adapted to this form of dyspepsia, particularly when the patient's strength is at all impaired.

c. In endeavouring to restore the healthy secretion of the bile, some form of mercurial cannot easily be dispensed with; but the employment of this mineral should be so managed as to produce the desired effect upon the liver with as little injury as possible to the other parts of the system. All that is here wanted is something that may speedily correct the disordered function of the liver; and it is therefore unnecessary to give it so as to be received into the circulating system. To effect this object its local effect on the alimentary canal is all that is necessary; for, whether it act upon the liver by sympathy during its passage through the alimentary canal, or whether, absorbed from the alimentary canal by the radical branches of the vena portarum, and circulating through the liver, it stimulate that organ, its effect is so direct that it may be considered strictly local. It is best given in moderate doses repeated daily until the quality of the alvine evacuation or the state of the urine is decidedly improved. A few doses generally suffice; and its long-continued use is never necessary. It is more advisable to administer it in sufficiently active than in repeated small doses. The particular action sought for from the mercury is more certainly obtained by combining it with a small quantity of extract coloc. comp. or extract of aloes, to which a minute portion of the powder of ipecacuanha may be added. The pil. hydrargyr. is decidedly the best form of mercurial in this disorder. It may be given in doses of from two to four grains.

d. The impediment which is opposed to the healthy function of the duodenum by a torpid state of bowels is to be corrected by yielding a ready obedience to the calls of nature, and by endeavouring to establish an habitual evacuation by visiting the water-closet every morning after breakfast; by the use of the tepid water lavement morning or evening; and, failing these, by the use of the mildest aperients. According to our experience, those of which aloes forms the chief ingredient are the best. It may be combined with rhubarb, guaiacum, soap, and a small quantity of ipecacuanha, or James's powder; and in case of flatulence, with the pil. galban. comp. according to the formula already given. The aperient pill appears sometimes to be more efficacious and less injurious when taken with dinner. A convenient formula given by Dr. Yeats is the following:—

R Infus. anthem. ℥i.

Vini aloes 3i.

Liquor. potass. gr. xv.

Fiat haustus mane sumendus. But he prefers a combination of senna and quassia, viz.

R Lign. quassiae ℥i.

Fol. sennae ℥i. ad ℥iii.

Aquæ lbi.

Fiat infusum.

R Infusi ℥i℥.

Potassæ sulphatis ℥i.

Fiat haustus mane et meridiè sumendus.

As soon as possible, attempts should be made to discontinue the use of these artificial means, for a constant recurrence to any aperient me-

dicine is sure to establish ultimately a more permanent disease of the intestines.

3. Besides the means for fulfilling the last indications, all directly tending to correct the morbid condition of the duodenum, those which have the power of improving the tone of the alimentary canal in general, or the whole system, possess to a certain degree this power. Amongst the first we have seen the nitric acid in decoction of sarsaparilla or some light bitter infusion most advantageously used. Amongst the latter we may specify the cold ablu-tion of the surface, the shower-bath, the nitro-muriatic acid lotion, and assiduous friction with the coarse flannel glove. But in obstinate cases we have found the most effectual remedy in a course of alterative aperient waters, as those of the Muhlbrunnen of Carlsbad, either natural or artificial; more especially if (which is not rarely the case) this disordered function of the duodenum be engrafted upon, or be the result of, a general state of excrementitious plethora.

II.—*Inflammatory duodenal dyspepsia.*

Synonyms.—*Phagedæna, Cæl. Aurel.*; hepatitis obscura; hepatalgia infarctus, intemperie calida; aurigo ab obstructione calida; hypochondriasis melancholica, *Sauvages*; hepatitis chronica, *Cullen*; indigestion, second stage of, *W. Philip*; duodenite chronique, *Cazimir Broussais*.

General character.—Heavy dull pain; sense of weight or uneasiness in the right hypochondrium, confined to one point, or more generally diffused, more or less constant, but varying in degree, being sensibly increased a certain time after taking food, and in some degree subsiding as the process of digestion is finished; skin dry; extremities cold; but increased heat of surface during sleep, particularly of the palms of the hands and soles of the feet; complexion sallow; countenance dejected; urine scanty, high-coloured, and depositing a lateritious sediment; tongue more or less furred behind, of a glossy red colour at the point and margin, the redness being either bright, equal, or continuous, or brighter red points are dispersed over the general redness, or the papillæ unusually red, large, and developed, sometimes tuberosæ.

The form of dyspepsia which we are anxious to specify by the foregoing character, has been merged in the description of the diseases of organs considered more important, and whose functions were better known. By Hippocrates it was comprehended under atrabiliary affections; by Celsus and Aretæus it was not distinguished from the diseases of the liver or the disorders of the stomach; by the Methodists its symptoms were distributed amongst several diseases. The moderns have been misled by the same errors. Sometimes confounded with other diseases, we may find it under chronic hepatitis or hepatalgia, or, undue importance being attached to some of its symptoms, it assumes the name of gastrodynia or icterus, but still more commonly we may detect it under the mask of hypochondriasis or melancholy. Of the pathological condition which

constitutes the disease Cullen had a proper conception, and evidently includes it under *enteritis erythematica*; but he does not seem to have ascertained the symptoms of this particular disease, for he has no where described them except under chronic hepatitis. The disease is well described by Dr. Ferriar, of Manchester, who had himself been the subject of it, and was by him distinguished from diseases of the liver. Dr. G. D. Yeats followed up the observation of Dr. Ferriar with a spirit of practical and scientific inquiry; but it is to Dr. Wilson Philip that we are indebted for the full development of the nature of this disease and the distinct knowledge we possess of it, though we can by no means subscribe to the limitations by which he has defined its origin, or to the latitude which he has allowed to its issue.

Form of disease.—The derangement of the function of digestion which arises from an excited state, from increased vascularity, or from chronic inflammation of the mucous membrane of the pylorus and duodenum, is by no means a rare species of dyspepsia, and, although manifesting itself by a great variety of symptoms, is in no degree difficult of detection. Its symptoms are either direct, indicating the seat of the disorder, or indirect, shewing the full and various play of sympathy by which the different parts of the body hold communication with each other. Of the former kind are the dull heavy pain, the sense of weight, of anxiety, or uneasiness, which, sometimes commencing in the epigastrium, is generally seated in the right hypochondrium. This uneasy feeling is either confined to one circumscribed point, or it is diffused over the whole hypochondrium; sometimes it extends from the epigastrium round the right side to the spine like half a zone, giving the feeling as if the side were begirt and compressed by a sickle; often the course of the pain traces with anatomical accuracy the course of the duodenum downwards, and backwards in the direction of the right kidney, and then again inwards towards the umbilicus; very frequently the pain extends directly backwards under the right scapula. The uneasy feeling of the right hypochondrium very often corresponds with pain of the right acromion, of the upper part of the right arm, elbow, or wrist, or with a feeling of weakness or numbness of the whole arm; occasionally it extends down to the thigh, to the knee, right leg, or ankle, giving rise to some topical pain in this extremity, or to a more general dull pain or sense of numbness, so that the whole right side of the body feels weaker than the left. When digestion is not in progress, the pain and uneasy feeling of the right hypochondrium is considerably less sensible, seldom amounting to more than a sense of heat, gnawing, or sinking towards the epigastric region, with a frequent desire to take food, which frequently corresponds with a sense of heat, smarting, or blistering of the tip of the tongue, and with watering of the mouth. By complying with this craving for food, relief is for a time afforded, but after a considerable interval, from two to four hours, the uneasy feel-

ings are very much aggravated, in severe cases amounting to excruciating pain, bearing all the symptoms of a fit of gastrodynia, which continues for some hours, then gradually subsides; or which is at other times only relieved by vomiting, generally taking place three or four hours after taking food. The uneasy feeling does not usually amount to actual pain, but is described as a rawness and tenderness, and sometimes as a feeling of heat, as if hot water were passing through the intestine, or there is a painful feeling of distention, especially after meals, though no actual appearance of distension can be perceived. But often there is very sensible fulness in the same situation, extending downwards along the edge of the cartilages of the ribs and through the whole hypochondrium. The part of the right hypochondrium which is the seat of pain or uneasiness is also often very tender, the pain being sensibly increased by pressure, but generally it is not increased, on the contrary it is sometimes relieved by it. This tenderness is perceptible in the epigastrium, but most especially at the pyloric extremity of the stomach, and in the course of the duodenum, in the soft parts close to the edge of the cartilages of the false ribs on the right side; the cartilages themselves often become very tender, not unfrequently more so than the soft parts. This tenderness on pressure, which becomes much more apparent if the effects of pressure of the right and left hypochondrium be compared, like the pain, is very often circumscribed, being generally situated midway between the point of the sternum and the lowest cartilage of the ribs: in the region of the pylorus it is generally more constant, in the region of the duodenum only occasional. The patient is in general quite unconscious of this tenderness until it is pointed out by the physician. But not unfrequently neither pain, uneasiness, nor tenderness is referred to the bowel; but when food has been taken a considerable time, the general uncomfortable feelings of the patient are very much aggravated, the process of digestion being attended with an insupportable languor, lassitude, oppression, dejection of spirits, headach, thirst, fever, or other sympathetic affections.

Amongst the sympathetic affections or indirect symptoms of this diseased state of the duodenum, the affections of the head are most frequent; they are either a general painful confused headach, increased by stooping or by holding the breath, or a dull pain in the back part of the head, which feels tightly bound, or painful pulsation of the head excited by the least effort of attention; vertigo is also a very common symptom. Not rarely the intellectual functions are very much weakened or disordered; there is a general confusion of mind, impaired memory, or deficient power of attention. The external senses become sometimes quite dull, the vision indistinct or veiled with dark motes; the hearing, smell, and taste much impaired. The entire function of the mind not unfrequently becomes disordered, and mania itself we have distinctly traced to local irritation of the duodenum.

Irritation of the larynx, producing a short dry cough, or causing frequent efforts to expectorate a grey transparent mucus, (which sometimes becomes very considerable,) hoarseness, and loss of voice, a sensation of constriction of the chest with laborious breathing, and complete paroxysms of spasmodic asthma, are the sympathetic affections of the respiratory organs which frequently originate in this disease. In protracted cases of this disease it is by no means uncommon for phthisis pulmonalis to supervene, and ultimately terminate the life of the patient. It most frequently assumes the form of laryngeal phthisis, but generally a tubercular affection of the lungs lurks behind. Nor does there seem any difficulty in understanding this issue of the disease; nothing is more comprehensible than that the irritation of the duodenum should be communicated sympathetically to the mucous membrane of the larynx, trachea, and bronchi, or that the cachectic state induced by the long-continued derangement of the digestive organs, should produce the tubercular disease. This conversion of dyspepsia to phthisis was noticed by Dr. Ferriar, but has been only fully explained and insisted upon by Dr. W. Philip* and Dr. James Clark.†

Painful affections of the heart are consequences not less common, simulating the character of hypertrophy of the ventricles, sometimes of angina pectoris.

The urinary and sexual organs frequently feel the effects of duodenal irritation: hence spasmodic stricture of the urethra, painful affections of the testicles, priapism, and venereal dreams; also painful menstruation. Lumbago, painful affection of the hip and knee joints, rheumatism, rheumatic gout, nodosity of the joints, severe and deep-seated neuralgic pains of the legs, we have observed connected with this disease.

Sometimes the skin is the seat of the secondary effects of this disease. We have noticed, in conjunction with it, *herpes zoster*, *acne induratum*, *urticaria*, *lichen*, *psoriasis*, *pityriasis*, and *alopecia areata*.

Inflammatory or spasmodic affections of either extremity of the alimentary canal are common attendants of irritation of the duodenum, such as erysipelatous affections of the fauces, generally with a sense of tickling, soreness, or rawness of the throat. The uvula sometimes becomes much elongated, and, losing much of its contractile power, gives the sensation of something resting on the back part of the tongue, and sometimes descending lower, creates cough, a sense of choking, nausea, and even vomiting, frequently all comprehended under the common term of relaxation of the throat; not rarely the fauces and neighbouring parts are the seat of troublesome ulcerations, which, united with affections of the skin and osteocopic pains, make up the symptoms of pseudo-syphilis. On the other hand, *prurigo podicis*, sometimes accompanied with eruptions in various forms, spasmodic stricture of the anus or rectum, inflammation of the

mucous membrane of the rectum, hemorrhoidal swellings, painful and irritable excrescences and fissures, are sympathetic consequences of this disease.

But whatever be the particular sympathetic affection which may result from the disorder of the duodenum, there is one general and constant which belongs and gives character to them all—hypochondriasis, despondency and dejection of spirits, the mind constantly intent upon and occupied with the bodily feelings.

The preceding complaints, whether direct or indirect, are always attended by symptoms sufficient to indicate that the natural functions of the body are in a state of disorder. Though the appetite may not be deficient, it is seldom natural; it is various and capricious, generally keen, craving, not rarely ravenous; there is a sense of sinking, of gnawing, or a constantly recurring desire for food, only temporarily relieved by taking it; or an uneasy sensation, or craving, mistaken for hunger—*mendax fames, cibi, appetentia, corpore non indigente*. Bulimia is sometimes a symptom of duodenal irritation, corresponding to the *phagedæna* of Cælius Aurelianus, which we have accordingly not hesitated to place among the synonyms of this disease. There is no particular thirst. The bowels are habitually confined; under the use of animal food they are more costive; with a vegetable diet they are frequently disposed to be relaxed; a fit of bilious diarrhoea from time to time is not however a rare occurrence; and an habitually loose or irritable state of bowels is sometimes observed, a dejection following soon after a meal; purgatives also occasionally act in small doses, but frequently with aggravation, instead of relief, of the symptoms. In this state laxative medicines are generally uncertain in their effects, and frequently apt to act too violently. The evacuations present great variety in their appearance; they are not always different from those of health; sometimes they are perfectly natural, but generally mixed with mucus in a concrete tenacious state; more frequently they are scanty, adust, and hard, in small knots of a dark blackish green, frequently of a dark olive green, sometimes of a blackish brown colour; they are frequently smeared with mucus and deficient in smell; occasionally two or three dark fetid stools are discharged, small in quantity without being figured; or there is a loose stool of a greenish brown colour, in smell resembling the grounds of sour beer, which is often preceded by great depression of spirits; not rarely they are like tar. Generally they are too dark, and occasionally almost black, but frequently they are of a white clay colour; sometimes there is frequent purging of a substance like the whitest pipemakers' clay, more or less diluted with water; which state has been known to occur when dissection proved the liver to be free from disease, and the gall-bladder containing healthy bile. The urine is scanty, high-coloured, sometimes of a dark copper colour, or even opaque, and as dark as mahogany or porter; it always reddens litmus paper, and generally deposits a lateritious sediment. The tongue is smooth, or covered with a thin loose mucous fur towards the root,

* Op. cit.

† Influence of Climate, &c.

of a clear red colour, neither a bright nor a pale red; but its anterior part is spotted with small red flat spots of a darker or brighter red colour, not rising above the level of the surface of the tongue, the papillæ being very small or very indistinct; or the whole surface of the tip of the tongue and anterior margin is unusually red, with some of the papillæ more or less enlarged; and in this situation there is frequently a sense of heat, smarting, or of blistering, frequently distinctly corresponding with the uneasy sensation in the right hypochondrium. The tongue is always more or less furred towards the root, either with a thin shining coat anteriorly, or clean and moist. The lips always correspond with the state of the tongue; they are of a glossy red colour, or their cuticle is dry and exfoliatory. In protracted cases the lips grow dry, and are divided by fissures: the tongue is covered with a rough yellowish crust, brown towards the root; in some cases there is a peculiar raw appearance of the tongue and throat; at other times the tongue presents a peculiar red, dry, and glazed appearance.

The skin is generally dry and scabrous, sometimes scaly almost to ichthyosis; the complexion is dull and sallow, and the conjunctiva has invariably a tinge more or less of yellow. The pulse is either quicker than natural, or easily accelerated, but seldom ranges habitually above eighty. In the quality of the pulse there is always perceptible a certain degree of hardness or rather tension, which, according to Dr. W. Philip, is in its slighter degree easily detected, in feeling the pulse, by gradually diminishing the pressure of the finger. On some occasions it is very quick and small, but always with a certain degree of tightness, the most certain measure of the general state of the secretory surfaces. The temperature of the body is very variable and unequally distributed; sometimes there is considerable fever or feverish heat; sometimes chilliness independent of any change of temperature of the surrounding medium, at times interrupted by fits of oppressive heat; during the day the hands and feet are often obstinately cold, but after eating and during the night the palms of the hands and soles of the feet often become preternaturally dry and hot, and there is a tendency to partial heavy sweats, sometimes very profuse during sleep, more especially towards the morning. And not unfrequently there is a feeling of a slight but protracted feverishness when the pulse is not at all affected.

Pathology and etiology.—That the symptoms we have just described are all referable to different degrees of increased vascularity, sometimes to inflammation of the mucous membrane which lines the pylorus and duodenum, there is little room to doubt. It has been directly proved by numerous dissections; it has been confirmed analogically by cases of organic disease of this part of the alimentary canal, where the pathological condition gave rise to increased sensibility of the mucous surfaces, as in ulceration; the nature of the remedies most usually giving relief afford strong confirmation of this opinion; and, were

more direct proofs wanting, it is the only hypothesis capable of rendering a satisfactory explanation of the symptoms. For if we consider the nature of this pathological state of the mucous membranes, the various degrees in which it exists, the particular part of these organs in which it may be seated, whether above or below the termination of the common gall-duct, whether it may affect the whole mucous tissue, or confine itself to the follicles or to the villousities, and, lastly, the extensive sympathetic relation of these organs, by which the irritations of their morbid conditions may be felt and reflected, we shall be furnished with abundant elements from whose combinations it will be easy to explain all the variety of symptoms, direct and indirect, primary and secondary, constant and accidental, which the disease presents. We shall thus understand how the appetite, if there be no fever, instead of being impaired, is generally increased, sometimes keen and ravenous, though the bowels are habitually confined, knowing it to be the nature of the alimentary canal to have its peristaltic motion increased towards any point situated below, and diminished from any point of irritation situated above; how the erythematous state of the mucous membrane of the duodenum, disordering its peristaltic motion, may impede the flow of bile, and may in different ways derange the functions of the liver; how the secretion of bile, generally diminished, may be sometimes increased when inflammatory irritation exists about or below the orifices of the biliary ducts, thus leading to bilious diarrhoea, to imperfect *encholosis*, and all the variety of alvine evacuation; how an inflammatory action of the duodenum, even when existing only in a slight degree,—so slight as to elude the closest observation unless the mind be attentively directed to it,—may excite the liver to an unhealthy action, from which a state of *erethism* and irritability of the whole alimentary canal may ensue; and hence how purgatives act so irregularly;—or, on the contrary, how the vascular injection of the mucous membrane of the duodenum, being the effect of a sanguineous congestion of the liver, by which its freedom of circulation and its secretion is suppressed, may be attended with a diarrhoea in which the alvine evacuations are of a light colour; and how a particular form of jaundice (*icterus à plethorâ*) may be produced. The well-known sympathies of the different parts of the alimentary canal with each other, supply the means of accounting for the appearances presented by the throat, the mouth, and the tongue, and for the uncomfortable and painful symptoms which sometimes take possession of the other extremity of the canal; and the universal consent of the state of the alimentary canal with the body in general, or with some organs in particular, explains the multifarious secondary affections which may supervene upon this disease.*

* For a full account of the sympathetic relations of the duodenum with other parts of the body, the reader may consult with advantage Dr. Yeats' excellent paper, *Med. Trans.* vol. vi.

Nor does it seem more easy to explain the symptoms of this morbid condition of the mucous membrane of the duodenum than to account for its production, if we consider the operation of the causes in which it originates. Thus it is that atonic gastric dyspepsia long-continued, (by which as it were the stomach shifts its function upon the duodenum, the pylorus being irritated by the passage of substances imperfectly digested, and the duodenum, instead of receiving a substance of the bland nature of chyme, becomes the receptacle of the crude residuum of an imperfect digestion,) is observed to prepare the way for this form of dyspepsia, and frequently to terminate in it—more rarely to be relieved by it. In the same manner, though the function of the stomach may not be imperfectly performed, if persons indulge in the use of substances which no power of digestion can assimilate, (as unripe fruits, crude vegetables, the seeds and skins of fruit, the kernels of nuts and stone fruit,) the operation and the consequence will be the same. And in like manner, when sufficient time has not been allowed for the digestion of one meal before another is taken, the duodenum becomes unnaturally distended, from which irritation and an inflammatory state of the mucous membrane may arise,—a circumstance which, occurring frequently in children, inducing a saburral state of the mucous membranes amounting to inflammation, constitutes the preparatory process to the particular remittent fever which afflicts that period of life. But from whatever cause gastric or intestinal fever may arise, chronic inflammation of the mucous membrane is one of their most constant sequelæ; and we must confess that our experience knows no cause of this form of dyspepsia more common than improper diet in the convalescence of those fevers. In persons habitually subject to dyspepsia, which naturally predisposes to irritation of the mucous membranes, an inflammatory state of the duodenum may arise from suppressed perspiration, from exposure to cold, particularly in dry weather, either hot or cold, as is frequently observed in the spring; and in the same way it is a common sequel of catarrh, and a frequent consequence of the retrocession of eruptions of the skin. But of all the causes capable of inducing this morbid condition of the duodenum, there is undoubtedly none more sure, and none more general, than the injudicious use of medicines in the treatment of other forms of dyspepsia, in which irritating drastics, heating tonics, and stimulants are lavishly and uninterruptedly applied to delicate and sensitive membranes either already inflamed, or which they seldom fail to make so.

There is also another source of this disease which deserves notice, where it presents itself as a secondary affection, the consequence of a state of plethora or congestion of the vena portarum, from which results vascular injection of the mucous surfaces, giving rise, under irritation, to inflammation of a subacute or passive form, *dyspepsia hemorrhoidalis*;* and also a corresponding form of disease which arises from

plethora of the uterine system, where the menstrual relief has been insufficient, *dyspepsia dysmenorrhæa* and *amenorrhæa*.* Upon this state of disease it is not uncommon for menorrhagia from time to time to supervene. The irritation of teething in children, from some sympathy, direct or indirect, with the liver, the bile being suppressed and hepatic plethora induced, not rarely induces the morbid condition of the mucous membrane which constitutes this disease, *dyspepsia dysodouriasis*. Hence the light-coloured evacuations, and hence the discharges of blood, in short the dysentery of infants in dentition.

Treatment.—The method of cure of this species of dyspepsia naturally divides itself into the following indications: 1. to correct the morbid condition which constitutes the disease—to remove the vascular excitement or inflammatory state of the mucous membrane lining the pylorus and duodenum; and 2, to render the function of digestion easy of performance, by which the causes of the disease will be avoided.

1. The principle of this indication must necessarily be antiphlogistic; but its application requires nice and delicate modifications and adjustments to ensure its success, or the physician may plunge his patient into a state of depression which will frustrate his intentions. General bloodletting is seldom necessary; but if there be signs of general plethora, if the pulse be hard, tense, and resisting, if the pain of the right hypochondrium be severe, with much heat of surface, and much heat and dryness of the mouth and redness of the tongue, a small general bloodletting will be found to be the means which affords the most speedy and most permanent relief. It spares the necessity of topical depletion, and renders a much smaller quantity of medicine necessary, facilitates its action, and ensures its effect. When the symptoms indicate a state of plethora of the abdominal circulation, such as a full or varicose state of the veins of the lower extremities, swelling of the feet, pain in the loins, more especially in the sacrum, indicative of a hemorrhoidal disposition, dark-coloured or sedimentous urine, a large tongue, seemingly swollen with blood, and eruptions of the skin, the congestion is more speedily subdued, and with less expense to the constitution, by very small bloodlettings, repeated at intervals of a fortnight, than by any other method; and the result is easy of explanation—it seems as if the quantity taken away from the general circulation were supplied from the circulation of the vena portarum, by which the congestion is diminished, and freedom given to the passage of the blood in the hepatic system. Where neither of the above-mentioned states is present, the local detraction of blood from the tender part of the epigastrium or hypochondrium by leeches or by cupping, to the amount of from four to twelve ounces of blood, according to the circumstances, will be found to satisfy the object of this indication; but if after a few days the symptoms do not indicate improve-

* Cullen.

* Id.

ment, it must be repeated. Except in nervous, irritable, and easily excitable persons, it is often of general service and sometimes very successful to endeavour to induce a derivation of blood upon the hemorrhoidal vessels by the application of leeches to the margin of the anus. The antiphlogistic effect of both general and topical bloodletting may be increased, and rendered more durable by the various methods of counter-irritation and derivation to the skin. For this purpose we think the tartar-emetic ointment or plaster is much to be preferred to blisters; but these also are occasionally useful. In old and protracted cases we have known the greatest comfort derived from the long-continued use of a warm plaster, gently stimulating, sufficiently large to cover the whole hypochondrium. In cases where the obstinacy of the complaint justifies it, either yielding with difficulty or frequently recurring, no method of counter-irritation is to be compared to a seton, from which the most permanent good results are frequently obtained: it should be introduced obliquely in the direction of the cartilages of the false ribs.

In aid of depletory means, or where the degree of the symptoms have not called for them, considerable benefit may be derived from certain medicines which have a direct antiphlogistic effect upon the mucous membranes of the intestines. These, according to our experience, are castor-oil, nitrate of potass, antimonial, and vegetable acids. The castor-oil should be given in doses of a drachm, repeated once in the twenty-four hours; it is best given at bed-time for its soothing and antiphlogistic effect upon the mucous membrane; but in the morning, if its aperient action is desired. In inflammatory irritation of the pylorus and duodenum it is a most valuable remedy, often by its soothing effect acting like an opiate, and has the most direct and the most remarkable power in allaying and relieving a heated state of the mucous membranes of the pylorus and duodenum. We must confess that we know no medicine more eminently endowed with this property. In obstinate chronic cases of this disease, we have known a small tea-spoonful of castor-oil taken every night at bed-time, as long as the stomach could easily bear it, a remedy attended with the most signal success. The effects of the castor-oil upon the stomach afford a very good test of the nature of the morbid condition of its mucous membranes. In atonic dyspepsia it is borne with the greatest difficulty, producing nausea and vomiting; in purely irritable dyspepsia a small dose of castor-oil acts severely and with much griping; but if there be any degree of vascular excitement of the mucous membranes, it soothes and quiets, and its effect is often most useful in this way when it has no aperient action. Its good effects will not be frustrated by administering it in any mild carminative water, in emulsion, in coffee, or by combining it with a little liquor potassæ. The nitrate of potass given in repeated small doses is a useful medicine, and of considerable power in correcting the vascular excitement of the mucous membranes. It may be given in doses of from five to ten grains three times

a day, in an ounce of water, to which a very small quantity of mucilage of gum arabic has been added. If there be much thirst, the nitrate of potass may be given in a saline draught; and if there be great irritability or restlessness, it may be combined with a small dose of the tincture of hyoscyamus, of lettuce, hop, or conium; if there be much dryness of the skin, it may be combined with a very small dose of vinum ipecacuanhæ, or Dover's powder. When the cold or atonic state of the stomach tolerates with difficulty the nitrate of potass, or as the symptoms subside, it may be exhibited in some bitters, as infusion of chamomile, quassia, or orange-peel, to which a very small quantity of spiritus ætheris nitrici, tincture of cardamom, or orange-peel, has been added: tartarised antimony in very small doses, as small as one-twelfth of a grain, may be given with the same intention as the nitrate of potass, and, by determining to the skin, sometimes more efficiently. It may be given in various vehicles, which, acting as modifying agents, adapt it to the particular circumstances of each case, as in saline draughts, orange-flower water, camphor julap, infusion of quassia, and such-like.

In a highly irritable state of the alimentary canal small doses of colchicum or hydrocyanic acid are frequently of signal service, and may be combined in the same way as the nitrate of potass and tartarised antimony.

The general effect of these antiphlogistic means will be very much promoted by the use of the fresh-water or sea-water tepid bath, daily, or every alternate day.

The intention of this indication will also be indirectly fulfilled by those means which, promoting the healthy secretion of bile, give freedom of circulation to the liver; and therefore, not before, but after depletion suitable to the case, and in aid of and combined with the means above specified, recourse must be had to hepatic alteratives, chiefly mercurial medicines, which require great care and discretion in their use. The pil. hydrargyri is in general the most suitable form of this medicine; if the bowels are irritable, or if there be a disposition to diarrhœa, the pulv. hydrargyri cum cretâ is to be preferred; if the bowels are extremely sluggish, calomel. In recent cases it is most advisable to give five grains of pil. hydrargyri, or three grains of calomel; in protracted cases, small and repeated doses are to be preferred, one grain, sometimes half a grain of blue pill two or three times a day, the object being to obtain the action of the mercury upon the liver without irritating the mucous membranes. We think it better to give the medicine continuously until the secretion of the bile is improved, than interruptedly, thus keeping the body longer under the irritation of the medicine. When the mercury appears to be exciting the mucous membranes without promoting the secretions, which will be known by the increased redness and dryness of the lips and tongue, it may be prudent to interrupt the use of the medicine from time to time. The mercurial may be advantageously combined with other medicines, to modify and

facilitate its action; as with small doses of the antimonium tartarizatum, or of the pulv. ipecacuanhæ, when it is desirable to influence the secretion of the skin; with nitrate of potass, pil. scillæ comp. to favour the action of the kidneys; with extract. aloes to promote the action of the bowels; with extract. hyoscyami, extract. conii, or extract. papav. if there be pain or restlessness; with pil. galban. comp. if there be flatulence or hysterical symptoms; and with any bitter extract or aromatic confection, if it oppresses the stomach. We have seen no advantage in this complaint from the inunction of mercury, and have found it less easy to regulate its action in this way; besides, it thus affects the whole system unnecessarily; and the advantage of mercury in this complaint being chiefly derived from its local action upon the liver, anything more is pernicious, and whenever the least sign of salivation appears its use ought to be discontinued.

The use of mercury will be very much assisted by taraxacum, a medicine which has also a very sensible effect in soothing the mucous membranes; and in mild cases this last will alone suffice. When given in an efficient formula, it is a most valuable remedy in this species of dyspepsia. The extract may be given in infusion of hop, chamomile, or orange-peel, in the compound decoction of sarsaparilla, and in nervous patients in camphor julap, to which may be added, according to the intention, a small quantity of nitrate of potass, of sulphate of potass, of compound decoction of aloes, or spiritus eth. nitrici.

R. Ext. taraxaci, ʒii.

Potassæ nitratis, ʒʒ.

Spiritus eth. nitrici, ʒi.

Infus. cort. aurant. ʒvi. M.

Cochleare amplum bis terve die sumendum.

The nitric acid, nitro-muriatic acid, and the solution of chlorine, are also useful auxiliaries after mercury, in some cases substitutes for it. They may be used internally in decoction of liquorice, or compound decoction of sarsaparilla, to either of which a little spiritus æth. nitrici may be added; or they may be used externally either in the form of bath or lotion. In case of diarrhœa supervening, their use should be immediately suspended.

2. This indication will be fulfilled, *a.* by a proper regulation of diet, suited to the degree of the complaint; *b.* by preserving an open state of bowels; and *c.* by assisting the function of digestion by mild tonics, and by proper air and exercise.

a. In the slighter degrees of this complaint very low diet is seldom necessary; a little mutton or chicken may be taken daily, or every second day, and is preferable to a diet consisting exclusively of farinaceous food. In other respects it should be light, bland, and cooling, and in small quantities at a time: light refreshing broths or soups in moderate quantity, light puddings, arrow-root jelly, rice-gruel, blancmanger of rice or semolina. In some forms of this disease it is sometimes necessary to restrict the patient wholly to a fluid diet, to jellies of amylaceous and farinaceous

food, gruel, asses' milk, and jelly of Iceland moss. In ordinary cases the stomach requires a certain quantity of animal food, and in this species of dyspepsia the fat of animal food, particularly the fat of bacon, is more easily digested than the lean; and it appears besides to have a useful effect in allaying the irritation of the mucous membranes, and in assisting the action of the bowels.

In severe cases, where there may be a disposition to feverishness, any increase of heat of surface, thirst, or night perspirations, it is advisable to abstain from wine. It must at all times be taken in very limited quantity, and its use from time to time interrupted, but it need not be wholly abstained from, and the digestion is very frequently promoted by it. Seltzer water is the best beverage in this complaint; but we have not found any inconvenience from light table-beer in small quantities.

b. The warm or cold water lavement is the best means of preserving an open state of the bowels. If this does not succeed, or cannot be used, castor-oil may be given in small doses night or morning; its aperient action may be assisted by combining it with manna, or a pill formed of pulv. aloes comp. two parts, and soap one part, may be used instead.

c. The process of digestion may in some degree be facilitated and assisted by light bitters, as the infus. quassiae, calumbæ, or cort. aurant. to which some neutral salt, as the nitrate or sulphate of potass, may be added in small doses; by the mineral acids, as the phosphoric, the aromatic sulphuric acid, or nitric acid in small doses; or by the cautious use of wholesome wine in small quantities. But the means which restore the tone and strength of the body in general are far preferable. These are proper exercise, neither heating nor fatiguing, as horse exercise, or a sea voyage; dwelling much in the open air, in a dry open air; change of air and place; cold abluition with vinegar and water; proper clothing, warm but not oppressive; and gentle occupation of the mind; all which remedial measures have been already sufficiently noticed.

We must not, however, omit to mention the use of mineral waters in the treatment of the chronic form of this disease, which combine the means of at once fulfilling all the foregoing indications, and render it difficult to know under which head to class them. The most efficient of these according to our experience are the Kreuzbrunnen of Marienbad, and the sulphureous waters of Harrogate. They may be taken warm or cold, as best may suit the sensibility of the stomach, its power of digesting or absorbing them. Their action should as soon as possible be derived on the bowels, and they ought to be continued until the healthy function of the bowels has been restored, and until the tongue has lost its heated and red aspect, and assumed a healthy appearance. In order to render their good effects more permanent, their dose ought to be gradually diminished. A course of goat's milk or whey drunk every morning in considerable quantities, has been known to have a similar effect. In Scotland

and in Switzerland it is frequently had recourse to; and we heartily join the late Dr. Ryal in his earnest wishes that an establishment for the supply of goat's whey were formed upon our Brighton Downs, which afford every means of doing so, and where the adjacency of a large town promises a ready consumption. We are inclined to think that the disorders of the liver in which it has been found to be so useful, have been only forms of inflammatory duodenal dyspepsia.

Though the treatment of the primary disease has only occupied our attention, we do not think that the secondary or sympathetic affections which originate in it should be wholly left to depend upon it. We think, whenever symptoms can be relieved without interfering with the general plan of treatment, it is always useful, and ought always to be attempted. As has been correctly observed by Dr. W. Philip, the secondary affections undergo the same change and partake of the same nature with the disease from which they spring; therefore the secondary affections in this disease are apt to assume an inflammatory character, to become more and more of a permanent nature, in the same proportion more independent of the original disease, and, on that account, more demanding the physician's careful attention. But with this passing observation our limits oblige us to leave them to be each considered under its proper head.

Strumous dyspepsia.

Under this title we are anxious to draw the attention of the profession to the form of dyspepsia which belongs to the scrofulous constitution, for in our opinion it presents a more characteristic feature of this habit of body than any physiognomical portrait which has yet been drawn of it. In this respect it is more to be depended on than either the fine skin, the clear delicate complexion, the light hair, large blue eyes, and dull scleroticæ of one variety; or the foul, dull, swarthy-coloured skin, the sallow complexion and swollen countenance, the dark hair, and tumid upper lip of the other. It betokens, indeed, little familiarity with scrofula to connect it with any particular temperament, for it belongs to all temperaments, to the sanguine as well as the phlegmatic, to the nervous as well as the melancholic, and to all their varieties and combinations. But upon whatever temperament the disordered habit which we call scrofula may engraft itself, we venture to say that this form of dyspepsia will also there be found; and, therefore, being constantly present with it, preceding and accompanying the various symptoms which issue from it, it would be contrary to all reason to refuse to it an important share in the development of this disordered habit, and in the production of the local affections which have hitherto too much engrossed the attention, to the exclusion of a proper consideration of the constitutional disease.

Of late years, however, the constitutional affection has received more of the notice of physicians. It has been described by Malfatti of Vienna under the name of *latent scrofula*,

by Dr. Ayre under that of *chronic marasmus*, and most faithfully by Dr. James Clark under the term *tubercular cachexy*; it has also been sketched by Dr. Marshall Hall under the title of *disorder of the general health in tuberculous affections*; but we are not aware that any of these physicians have connected it with a special disorder of the chylipoietic function.

Form of the disease.—In the offspring of scrofulous and also of dyspeptic, hypochondriacal, or cachectic parents, in the children of old men, in children who have been badly nursed, or who, brought up by hand, have been improperly fed, or reared in the impure air of crowded towns, symptoms of disorder of the function of digestion early manifest themselves, generally between the first and tenth year, often commencing with the first dentition, which is commonly painful and difficult. Though the child from time to time loses its appetite, it is generally morbidly craving or ravenous, even soon after a plentiful meal requiring fresh food, so that the nurse remarks there is no satisfying such children. The complexion loses its colour, the skin its tone, ceasing to compress the flesh; the flesh becomes soft and flabby, the appearance is languid, the belly generally tumid, and there is a want of the usual disposition to play, or to use the exercise common to that period of life. The little patient is soon tired, complains of aching of the legs and knees, desires frequently to be taken up; his temper is fretful, he is easily set a-crying, and his intellect is either precocious or unusually dull. His sleep is seldom calm and composed; he moans, talks, or grinds his teeth, sometimes screams and raves. His bowels are generally confined, and his evacuations are of a light grey colour, like pale brown paper, sometimes curdled with streaks of mucus; or they are of a greenish colour, frequently yeasty, of a sour and highly offensive smell, and very often the food is passed unchanged. Diarrhœa occasionally occurs, consisting usually of light-coloured or slimy stools, and the patient frequently complains of pain in the bowels or uneasiness of the stomach. The urine often deposits a whitish sediment; the breath is fetid or heated; there is some slight thirst, slight heat of skin, except on the extremities, which are colder than natural; the skin is harsh and dry, except during sleep, when there are frequently heavy but partial sweats. The tongue is redder than natural, and on its anterior part spotted with small points of a darker and brighter red colour than the general surface; it is seldom much furred, being either covered with a thin mucous fur, through which the red spots appear, or with a slimy brownish coat, or the fur is distributed in small circular white spots, more or less confluent, presenting altogether a dappled appearance. When irritation of the stomach supervenes, the tongue is dry and of a brownish red colour. These symptoms, seldom entirely absent, continue from time to time to recur, more or less severe in degree, as the causes of derangement, irregularities in diet, an indulged and pampered

appetite, may present themselves, being always most remarkably manifest after any of the ordinary diseases of childhood. As the child grows, unless the most judicious management has interfered with the natural progress of the complaint, other symptoms begin to appear. The patient becomes subject to sore throat, the fauces are redder than natural, and the tonsillary glands are observed to enlarge; there is a frequent tickling cough, and itching and picking of the nose and lips. The hands and feet are usually very cold and damp, or on the least cold turn of a dark livid purple colour, and the child is extremely subject to chilblains, even sometimes in summer. The patient is liable to be troubled with various affections of the skin, very early with *porrigo furfurans*, *psoriasis guttata*, *achorous* pustules on the hairy scalp, (the *tinea mucosa* of Alibert,) with *pityriasis*, *herpes circinnatus*, with *lichen* and *purpura*, frequently the *lichen urticans* and *purpura urticans*, at a later age *ichthyosis*, *pityriasis versicolor*, *porrigo decalvans*, *erythema nodosum*, and *porrigo favosa*, sometimes spreading over the whole body, and at a still later period of life, *acne indurata*, one of the most characteristic signs of this habit of body. All these diseases of the skin, in their external appearances so dissimilar, have yet in their nature a close affinity to each other, and, frequently convertible into and succeeding each other, seem only different external manifestations of the various degrees and modifications of the irritations of the internal organs. The eye is frequently the seat of various troublesome affections; hordeola constantly recurring, inflammation or purulent discharges from the ciliary glands, falling off of the eye-lashes, &c. Occasional discharges of blood from the bowels, epistaxis at a much earlier age than usual; copious mucous discharges from the bowels, sometimes from the vagina, are not rarely observed in this disease. Sometimes the cellular system feels exclusively the effects of the internal disease, a succession of cold indolent abscesses occupying every limb of the body. Frequently the nervous system is the seat of the secondary irritation, sometimes in its membranes and vascular structure, giving rise to inflammation and hydrocephalus; sometimes in its functions, inducing chorea, epilepsy, idiocy. The bones very commonly manifest symptoms of disorder, but the ordinary termination of the disease is the formation of that morbid growth or deposit well known under the name of tubercle, which, most usually seated in the lymphatic glands, has almost exclusively received the name of scrofula.

In young females about the age of puberty this disease frequently undergoes a remarkable change; for habitual constipation becoming established, another form of dyspepsia is induced, which in this constitution very frequently leads to spinal affections.

In the adult age the symptoms present considerable modification. The patient's complexion becomes pale, of a slightly blueish or leaden colour, particularly under the eyes; in dark complexions it becomes of a pale sallow or yel-

lowish colour; the body is more or less emaciated, the skin flaccid, the muscles flabby; there is an unusual sensibility to cold, the patient is very apt to shiver, and there is a constant tendency to coldness and lividity of the extremities. The appetite continues good; frequently it is craving, and the food does not appear to satisfy; sometimes there is a constant empty and sinking feel at the stomach, only temporarily relieved by eating, the patient feeling after a meal as if he had long fasted, and is again desirous of taking food. The bowels are confined; more rarely they are loose, discharging copious light or drab-coloured stools, which are frequently more than usually fetid. The urine generally deposits a whitish sediment, sometimes mucus. The tongue is red at the point, generally studded with enlarged papillæ, of a brownish red colour behind, but seldom coated. The pulse, always weak, is small and drawn, sometimes it is slow and weak. The sleep is seldom natural, the patient is restless during the first part of the night, and towards morning falls into a heavy unrefreshing sleep, during which he sometimes perspires profusely. He is listless and drowsy by day, and though the spirits are sometimes sufficiently cheerful, more commonly the patient is timid, nervous, torpid, or hypochondriacal. Frequently there is a great tendency to perspiration on the least exertion or the least excitement, and the palms of the hands and soles of the feet feel damp and clammy, frequently cold. The thyroid gland, the lymphatic glands of the neck and groin, are observed to be large and swollen, but not painful. In women, leucorrhœa, painful or deficient menstruation, in men, a disposition to hemorrhoids, is observed; but the usual progress of the disease is to *tabes mesenterica* or *phthisis pulmonalis*.

Pathology.—The phenomena of this disease, its whole complexion and character, sufficiently indicate a congestive state of the hepatic system; and were we to assume as the proximate cause of the disease a plethora of the vena portarum, both in its roots and branches, we should be furnished with the means of explaining all the symptoms of the disease; for we should readily understand how, in this state of the circulation of the abdomen, the mucous surfaces of the intestines should be full of blood, consequently subject to inflammatory irritations and disordered functions, whilst the peculiar office of the duodenum renders it especially liable to be the seat of them; how the function of the liver being deranged, all the other consequences of this disease may follow; for though we may not know precisely what share the function of the liver may have in the process of sanguification, we may easily understand how it may interrupt and interfere with this process, leading to a cachectic state of the fluids, from which result tubercles and other semi-vital and semi-organic productions.* Nor

* For a further explanation of this opinion, we refer the reader to our account of the formation of tubercles in Dr. Clark's work on Climate.

does it seem an improbable supposition that a disposition to abdominal plethora, or an organization which favours it, may be transmitted by parents to their offspring, more especially in dyspeptic and hypochondriacal persons, in whom the chylipoietic viscera, under constant irritation, are necessarily also in a state of congestion: we might thus explain how the strumous cachexy is continued, and how it is generated.

The foregoing view of the nature of this disease is also in conformity with the observation and opinions of other physicians. "In children," observes Dr. Wilson Philip, "the symptoms of inflammatory dyspepsia supervene early, and the disease in them commences in the liver rather than in the stomach." And Dr. Ayre has, in the following passage, confirmed our statement, though we have offered another explanation of it: "Diseased mesenteric glands occur in children from acrid condition of the duodenal contents; the liver, pancreas, and duodenal glands become diseased from congestion, and irritation will be propagated to the brain, giving rise to hydrocephalus, spasms, convulsions, vomiting, contortions of the countenance, affections of the sight, violent headaches, faltering voice, chorea, palsy."

Treatment.—The plan of cure of this disease consists in the following indications: 1, to correct the morbid condition of body which we have stated to constitute the essential foundation of the disease; 2, to render the function of digestion easy of performance by a regulation of diet suited to the nature of the disease; and 3, to improve the general tone and strength of the body.

1. In the ordinary degree of this disease it is seldom necessary to relieve the congestive state of the liver by the detraction of blood; but when there is much febrile excitement, with a red and dry tongue, with fulness or tenderness of the right hypochondrium, the application of a few leeches brings more immediate relief, and spares the necessity of much physic. In general the direct antiphlogistic part of the treatment is accomplished by a light diet, by the nitrate of potass given in repeated small doses, either in saline mixture or in some carminative or bitter infusion, as the case may admit, whilst the intention of this indication is also obtained indirectly by increasing the secretion from the liver. We entirely agree with Dr. W. Philip in his high estimation of this remedy, the nitrate of potass. Of itself partly a substitute for mercury, when combined with it, it renders less mercury necessary; with purgatives, it renders their action more free, and with antimonium tartarizatum it is invaluable in case of determination to the head. For promoting the secretion of the liver, mercury is the medicine most usually resorted to; as an occasional remedy for regulating the secretion of the liver, it is also probably the most safe and the most convenient. It should, however, be given only in interrupted doses, and should on no account be allowed to affect the system. The hydrargyrum cum creta combined with a few grains of subcarbonate of soda, and a minute quantity

of pulvis ipecacuanhæ, or pulvis Jacobi, we consider the best general formula. If the bowels are too open, the mercury may be combined with the pulvis ipecac. comp.; if confined, with a little magnesia, nitrate of potass; or extract of aloes; but in either case this alterative should be followed every morning, or every second morning, by a tea-spoonful of castor-oil, by a little electuary of cassia or senna, or by a small dose of sal polychrest. The effects of the mercurial medicine will be also very much promoted by following it up with a course of taraxacum or sarsaparilla, or both united.

The action sought to be induced upon the liver, and through that organ upon the abdominal circulation, by means of mercury, may also be obtained by means of iodine, in our opinion more efficiently and more permanently; and where the inflammatory state of the mucous membrane of the duodenum exists in a slight degree, we think that it merits the preference. We have been in the habit of using the tinct. iodin., and have had much satisfaction in its use in strumous affections, but we have always observed that its value has been invariably in the degree in which it acted on the liver. We have made it a rule to commence in small doses, gradually increasing them; and though we have never seen any untoward consequences from its use, we have invariably observed the precaution of from time to time interrupting its exhibition for a few days. Where there is any hæmorrhagic or scorbutic tendency, shown by eruptions of the nature of purpura, iodine is decidedly contra-indicated. It is probable that the muriate of lime has a similar action upon the liver, and may be advantageously used for this purpose.

In chronic cases we have seen the greatest advantage derived from a course of the Kesselbrunnen of Ems; and when there is any tendency to diarrhoea, we believe it to be preferable to every other form of medicine. The Obersaltbrunnen may be also used in similar circumstances.

When the state of the mucous surfaces admits of the exhibition of chalybeates, they prove an alterative of very great value, and possess considerable power of correcting the congestive state of the abdominal circulation. This property of chalybeates has in our opinion been very much overlooked; for though they are usually administered in this disease, they are never exhibited with this intention. The chief obstacle to their use is the state of the mucous surfaces; for if they be not in a cool and secreting state, chalybeates are repugned by them as irritants. On this account it is most advisable to select the salts of steel the least exciting, as the ferrum tartarizatum, or to qualify the chalybeates by saline refrigerants, as by uniting the carbonate of iron with small doses of the nitrate or the sulphate of potass; or, best of all, by giving the remedy in the form of some saline chalybeate water, as the Eger. We have lately been in the habit of combining the iodine with chalybeates, and we think with very considerable benefit. They appear to correct and pro-

note each other's action. This is our formula:—*R. Tr. muriat. ferri, tr. iodinii aa ʒiii. aq. puræ ʒʒ. Guttae x. ad xxx. ter die sumendæ.* The congestion of the hepatic system may also be relieved by increasing the action of the kidneys and skin; that of the former will be promoted by the alteratives already mentioned; and that of the skin will be excited by the tepid sea-water bath, by sponging the body with vinegar and water, or salt and water, by the use of the nitro-muriatic acid lotion, by warm clothing, and by exercise; and, failing this, by gentle friction of the whole surface of the body for at least half an hour daily.

Unless a free and open state of the bowels be made to concur with the preceding remedies, they will prove abortive; but violent purging by irritating medicines is equally to be avoided. A soluble state of the bowels, procured by such mild remedies as have been already mentioned, is all that is to be desired. Sometimes a course of purging by the sal polychrest or the Harrowgate salts is of service; and when a sluggish state of the colon coincides with this disease, it is absolutely necessary that this intestine should be unloaded and preserved so.

2. Except under occasional febrile symptoms from an aggravated degree of the disease, the antiphlogistic regimen is unnecessary, and it ought never to be long-continued. According to our experience a limited diet of animal food, nutritious and easy of digestion, answers best. The meals should be small, consisting chiefly of animal and farinaceous food; all vegetables and fruits ought to be avoided, or used very sparingly. Cows' milk seldom agrees well, and ought therefore to be considerably diluted; occasionally a little beef-tea or plain bouillon answers very well as a substitute for breakfast when milk is found to disagree. Wine, porter, ale, and beer are unnecessary, and therefore better avoided. In this disease fish is a very unwholesome food.

3. In ordinary cases, when the organs of nutrition are restored to a healthy state, the natural resiliency of the constitution can generally dispense with artificial assistance; but with feeble powers of body—a marked feature of the disease of which we are treating—some further help is necessary. We cannot, however, speak much in favour of internal tonics, excepting chalybeates, (which we do not view simply in the light of tonics,) and of them we have already said enough. More benefit is derived from tonics externally applied. Of these, unquestionably the most powerful is the cold sea-bath, and the most beneficial, unless it produces languor and chilliness. The shower-bath, cold ablution, exercise in the open air, in a dry free atmosphere, either by the sea-shore or in an elevated situation. The exercise should be moderate, chiefly on horseback, or, for children, on donkeys. Amusing plays, moderate and agreeable occupation of mind; gentle friction over the whole surface for half an hour every evening; and lastly, occasional change of air and change of habits.

III.—*Follicular duodenal dyspepsia.*

Synonyms.—*Hypochondriasis pituitosa*;* *Auct. Var.*; *aurigo frigida* ab obstructione, *Sauvages*; *infarctus, Kämpf*; painful affections of the intestinal canal, *Powell*.†

General character.—Symptoms of painful or difficult digestion, felt chiefly a considerable time after taking food, most frequently observed in phlegmatic habits; occasional alvine discharges of mucus in various morbid states; acute attacks of gastrodynia or jaundice sometimes intervening.

Form of disease.—In persons of a cold temperament and relaxed habit, characterized by softness and want of elasticity of fibre, dark carbonized blood, a slow circulation, a soft pulse, low animal temperature, yellowish or chlorotic, and sometimes swarthy paleness of the skin, who are also much disposed to sleep, shewing great languor, sluggishness, and apathy in their feelings, and betraying a want of decision and energy in their moral and intellectual character,—disorder of the duodenum assumes a particular form, depends upon a peculiar morbid condition, and manifests itself by certain characteristic symptoms.

The general progress of this species of dyspepsia is insidious, and can hardly be distinguished from the other forms of duodenal disease, except that the appetite is commonly much impaired, sometimes to loathing. There is great languor, lassitude, and incapacity for every exertion. The patient complains of a sense of load, distention, or pain some hours after taking food, and the digestion is accompanied with flatulence, oppression, anxiety, sometimes amounting to a feeling of suffocation. There is no remarkable loss of flesh, but the appearance of the skin is much altered; the complexion becomes bloated, loses its colour, is dull and cloudy, sometimes swarthy, frequently clammy, greasy, or waxy, as if covered with a thin film of melted wax; or the skin is sallow and somewhat jaundiced; it feels generally cold, moist, and clammy, the hands and feet particularly so. The lips and gums are generally pale; the tongue is moist, pale, and flabby, covered with a pearly white mucous coating, but seldom much loaded; sometimes there is a thick, shaggy, cottony fur. The mucous coating of the tongue often has the appearance of a false membrane, which, falling off in pieces, leaves patches quite clean, sometimes red and morbidly tender. The bowels are almost always constipated, but diarrhoea is sometimes, though rarely, observed; the stools are light-coloured, porraceous and abundant, out of all proportion to the ingesta, and having often a faint mawkish smell; occasionally they are dry and dark-coloured, more frequently fluid and dark, of a greenish or brownish black colour, and not uncommonly dark, viscid, and pitch-like. But the characteristic feature of the evacuation are considerable quantities of mucus, which are discharged in various morbid states and forms: some-

* *Fracassini*, cap. 4, p. 388.

† *Med. Transact.* vol. vi.

times it resembles transparent jelly, or is glairy like the white of an egg; frequently yellow and viscid like the yolk of an egg; sometimes it assumes the solid form, appearing in concrete masses varying in size and figure, frequently resembling small bits of tallow, wax, suet, or bits of the blanched kernel of walnuts; in other cases it appears in large shreds of a semi-transparent membrane of considerable tenacity; or large quantities of flakes mostly torn into irregular shapes, and appearing to have formed parts of an extensive adventitious membrane of no great tenacity or firmness; sometimes the membrane is passed in perfect tubes of considerable extent. Frequently it is passed in solid cylindrical forms like shreds of boiled macaroni or vermicelli, not rarely mistaken for the detritus of worms; and on some occasions considerable quantities of mucus of a purulent appearance are discharged at once, leading to the supposition that an abscess has burst internally. These discharges of mucus appear to take place periodically, and as it were critically, being in general preceded by considerable aggravation of the symptoms, whilst the recovery is attended with evacuations of quantities of mucous or glutinous substances.

In these attacks the patient is sometimes suddenly seized with acute spasmodic pain in the right hypochondrium darting through to the back, frequently accompanied with vomiting or a hard dry cough, by either of which the pain is greatly exasperated. Often there is sudden and excessive pain towards the epigastrium, returning with vomiting, in violent paroxysms. These pains are occasionally rather relieved by pressure; but the parts are frequently so sensitive that the slightest touch cannot be borne, and even during the intervals of the pain the patient complains of great tenderness and soreness in these parts. The tongue, already coated with a white fur, becomes dry, the pulse accelerated, the stools white, the urine turbid and of a dark red colour, like blood. As the pain remits, the patient is bathed in a profuse perspiration. After a day, sometimes longer, the skin becomes jaundiced, and on examining the evacuations, instead of gallstones, as he expected, the physician finds copious flakes of mucus in various forms, which are passed with considerable relief to the patient. This mucus, sometimes fluid and approaching to pus in appearance, has, in connection with the foregoing symptoms, frequently imposed the disease upon the attendants for the rupture of an abscess of the liver; but the same symptoms and the same discharge occasionally occur without jaundice or any symptom of hepatic obstruction.

The urine, in the ordinary progress of the disease, is extremely variable; in the early stage it is rather pale and abundant, occasionally crude and transparent like water, and voided in considerable quantities; but during the severity of the symptoms this secretion becomes very deficient, high-coloured, and extremely loaded, sometimes of a deep orange

colour, unless there be some obstruction of the biliary secretion, when, as has been already observed, it is of a dark blackish brown colour, like porter, or, mixed with a copious lateritious sediment, it almost resembles blood. The pulse, except during what may be called the acute attack, is always weaker than natural, generally slow and small, more rarely frequent and small, or wiry and fluttering.

The seat of the disorder may entirely escape the notice of the patient and even the observation of the physician; the chief complaint, frequently the only object of the treatment, instead of indicating any derangement of the function of digestion, may be an affection of another part of the body, some of the multifarious symptomatic diseases which originate in this disorder. Among the secondary affections which occasionally accompany this morbid state of the small intestines, (for we do not pretend to confine it strictly to the duodenum,) are, a remarkably altered state of the temper and feelings, languor, indifference to every thing, complete apathy, sometimes stupor or fatuity, sadness, great depression of spirits, obstinate melancholy, great irritability of temper, moroseness, obstinate silence and reserve. Sometimes the patient is oppressed with irresistible drowsiness during the day, and troubled with want of sleep at night, or the sleep is disturbed by dreams and incubus. The uterine functions seldom escape the influence of this disorder; menstruation is generally deranged, being either painful, irregular, or deficient, and the secretion pale-coloured: leucorrhœa is a very common attendant of the complaint in early as well as in protracted cases. Frequently the patient complains of uneasy sensations about the heart, of a sense of fluttering, of violent palpitation or syncope. The organs of respiration often suffer in consequence of this disorder; hence dyspnoea, short dry cough, frequently moist humoral cough with a grey viscid expectoration, or pain and sense of weakness of some part of the chest; in children a spurious form of croup is one of the most common symptomatic affections. The nervous system is often the chief seat of disorder, and chorea one of its most common forms; sometimes it affects the whole body, less often only one half the body, generally the right, and on some occasions only one of the extremities, very commonly the right arm. Paralysis, generally partial, affecting one, seldom more, of the limbs, is another form of secondary affection. Painful local affections are often the chief subject of complaint, rheumatic paralysis, rheumatic gout. *Erysipelas*, *erythema*, *acne*, and *impetigo*, are the most common affections of the skin which originate in this disorder.

The unfavourable progress of the disease leads to a state of general cachexy, *cachexia pituitosa*, which sometimes terminates in anasarca.

Pathology.—This species of dyspepsia, noticed by some of the ancient physicians, has been more frequently concealed under the name and description of other disorders. Oversha-

dowed by the secondary affections which originate in it, it is only to be found masked under the symptomatic forms of other diseases. But the morbid products of the mucous secretion have scarcely escaped the observation of any practical physician. Marcard* and Stoll† have particularly described them; Theden‡ and Hoffmann§ have considered them as not an unfrequent cause of sudden death; Bonnet, Morgagni, Vesalius, Brunner, and other pathologists worthy of every confidence, have discovered them in the dead subject; and the minuter researches of modern anatomy have traced them to their proper origin. But this morbid condition of body never received its due share of importance until the work of Kämpf,|| a Dutch physician, by whom it was first professedly described under the name of *infarctus*, and who must be considered to have established it as a particular disease. Though this author was in some degree guilty of the common error of most original thinkers, of overstepping and overcharging his premises,—for he said he recollected few diseases which were not originally referable to *infarctus*,—it was not so much this fault as his singular method of cure, which failed to lead to a more general reception of his opinions, which, except in Germany and Holland, have been too little attended to. In our own country, as far as we are aware, the pathological condition of this disorder has never been accurately specified, though the secondary forms of diseases under which it masks itself have been frequently described. A few interesting cases of the primary disorder have been given by Dr. G. D. Yeats,¶ but more particularly by Dr. Powell.**

It has been observed by those who have devoted much attention to morbid anatomy,†† that the mucous glands of Peyer and the follicles of Brunner do occasionally present appearances very different from that of the healthy state. Sometimes they are found unusually developed; as large as mustard-seeds; frequently they contain a whitish concrete matter, more or less friable, bearing a close resemblance to the caseous or lardaceous matter of tubercles; at other times a great number of small white bodies are found disseminated over the surface of the intestines, corresponding to the grub or *emphragma sebaceum* of the skin; for they are nothing more than the follicles filled with concrete mucus. These bodies occasionally acquire considerable size, but seldom exceed that of a pea; sometimes they are elongated, projecting in the form of little excrescences or fungous papillæ; or on the contrary, the follicles are flattened and depressed, with their orifice more or less appa-

rent, from which is thrown out a thin greyish mucus, which sometimes collects in astonishing quantities in particular parts of the intestinal canal, or, spreading itself in every direction, forms a thick mucous coat over a considerable part of the surface of the intestine, which on the first view might easily be mistaken for the mucous membrane itself in a white and healthy state; sometimes it is a tenacious mucus of a dark brown colour; or instead of this greyish semi-transparent semifluid mucus, a concrete matter, equally secreted by the follicles, may spread itself in the form of a membrane, more or less dense, over the surface of the intestinal canal; or instead of being spread on the surface, this concrete matter may form solid masses, as occurred to the celebrated Justin Lipsius, who, though treated by his friend and colleague Heurnius, suffered for a long time from this complaint, and was not relieved till he had voided a viscid mass of the colour and form of the intestines.

It was the doctrine of the school of pathology just disappearing, to consider all these morbid appearances as the result of inflammation of the mucous surfaces. Dr. Parry observes that the appearance of the fibrous and curdled stools of children, and the consistent concrete membranes taking on the tubular form of the intestines in adults, which are often evacuated from the bowels in slight inflammatory affections of the mucous membrane of the colon and rectum, so often mistaken for worms, consist rather of coagulated albumen than of concrete mucus; but there does not appear any just reason for this opinion. We have observed these without the remotest sign of inflammation; nor did Dr. Powell observe any, but on the contrary states that the most remarkable circumstance in the history of his cases was the production of an effect usually ascribed to inflammatory action without its previous existence.

There will be little difficulty in understanding how all the various symptoms and sufferings described as originating in this morbid condition of the mucous follicles may be consequences of it, if we allow a due importance to these organs in preserving a healthy action of the membrane of which they constitute so essential a part. On comparing the various morbid appearances presented by a disordered state of the follicles, we may remark that they divide themselves into two classes; one in which the secretion is suppressed or retained, and another in which it is excessive or overflows, to each of which opposite states a more precise observation will in all probability ascribe its appropriate symptoms. In the mean time it may be easy to conjecture how the mucous membrane, not defended by its appropriate secretion, may acquire a preternatural sensibility and irritability, which, not only disturbing the function of digestion, and giving rise to most painful affections of the intestinal canal, but rousing the actions of its sympathetic organs, may induce any of the disorders which we have noticed; and how, on the other hand, the membranes, sheathed and muffled by the morbid envelope, and thus deprived of their sensibility,

* Description de Pyrmont, vol. iii. pp. 45, 90.

† Ratio medendi, p. ii. pp. 319, 346.

‡ Remarques et Experiences, vol. ii.

§ Med. Ration. vol. v. de morb. infant. Obs. ix.

|| Abhandlung von einer neuen methode die hartnäckigsten krankheiten die ihren sitz im unterleibe haben, zu heilen. 1784.

¶ Op. citat.

** On certain Painful Affections of the Intestinal Canal, Med. Transact. vol. vi.

†† Andral, Anat. Path.

will induce disorder and excite sympathies of another character, and will also sometimes become mechanical causes of irritation and obstruction. The inconvenience of a dirty skin, as a writer on this subject observes, is felt, because its obstructed pores prevent the transmission of that insensible perspiration which is essential to health; languor, sickness, headache, and other inconveniences originate precisely in the same manner, from filthy intestines. And we know that the mucous membrane, either by sympathy or association, sometimes degenerates into a state relatively similar to that of the teguments of the surface of the body, which sometimes become hard, harsh, and rough; or glossy, smooth, and shining, like parchment; pale, weak, and withered, or covered with large thick scales of cuticle adhering to its surface, thus losing all its permeability; or, on the other hand, besmeared with an excess of sebaceous secretion covering the skin with an oily, greasy, or waxy coating. When both these secreting surfaces, the skin and the mucous membranes, cease at the same time to perform their offices, it is not difficult to understand how the fluids become disordered, how nutrition becomes impeded, and how the most inveterate forms of cachectic complaints ensue.

Our pathology of this complaint receives considerable illustration and confirmation from considering its causes. It has been observed most frequently in females and children, in whom the mucous follicles are most developed; it prevails most in cold humid seasons, in cold humid climates, and therefore, prepared by the influence of winter, it often declares itself in early spring, and on the return of cold in autumn. Sedentary employment in confined and impure air, with neglect of personal cleanliness, are the circumstances most powerful in producing it; to which may be added unwholesome food. When the predisposing causes have been in operation, it is generally immediately excited by colds, errors of diet, drastic purgatives, fatigue, watching, anxiety, alarm, and bodily accidents. Constipation of the bowels, while it is a consequence, is also one of the exciting causes of this disease.

Method of treatment.—The indications for directing us in the cure of this disease, are, 1, to render the function of digestion easy of performance by a proper selection of food, by preserving an open state of the bowels, and by proper exercise; and, 2, by endeavouring to correct the morbid condition of the follicles, which constitutes the proximate cause of the disease.

1. Having already so fully and so frequently considered the means of fulfilling the first indication, it will be unnecessary again to recur to that subject; we shall, therefore, content ourselves with referring to the treatment of *follicular gastric dyspepsia*, and shall for the present confine our observations to the means of fulfilling the second indication.

2. Some medicines appear to exert a particular influence upon the functions of the mucous follicles. According to our experience they consist of purgatives, especially rhubarb,

senna, scammony, and aloes, of sulphurous and some neutral salts, as sal polychrest, muriate of soda, of alkalies, mercurials, chalybeates, of iodine, colchicum, gum ammoniacum, and ipecacuanha. Amongst several means capable of effecting the same object, it is a received principle of physic to select those whose operations are best known and most under controul, having recourse to others only when their use cannot be dispensed with. Accordingly, some of the purgatives above enumerated, either alone or in combination, form the proper remedy of this complaint in milder cases; and where no signs are present indicating an inflammatory or excited state of the mucous membranes, rhubarb, with sal polychrest and a small proportion of ginger, the pulvis scammoniae compos., the infusion of senna; in cold habits, the vinum aloes, the decoct. aloes comp., and the baume de vie, are convenient combinations. Dr. Powell found, in his cases, that the infus. sennæ with the infus. gentian. comp., and from x to xx minims of liquor potassæ, repeated so as to produce four or more stools in the twenty-four hours, discharged the flakes of mucus better than saline aperients, and more efficaciously than mercurials. Where there were general torpor or coldness of the system with much pale urine, and dark stools with much mucus, Dr. Yeats observed very excellent effects from taking one drachm of the vinum aloes with xv minims of liquor potassæ in a little infusion of chamomile every morning. It is not enough that these medicines be taken in isolated doses. To give them effect, they must be steadily persevered in for some time. But their effects must be watched. If they cause irritation, heat, thirst, or much griping, they are not indicated, and may induce the very state we are seeking to remove. The largest fistulous membranes that we ever recollect to have seen discharged by stool, we observed in two ladies who were in the habit of using the electuary of senna every day as an aperient.

The operation of purgatives is rendered much more efficient when the bowels are prepared for their action by one or two small doses of alteratives. Of these the most certain and most manageable are mercurials, and we believe calomel to be the best form of this medicine. One, two, or three grain doses are generally sufficient, and, according to the state of the patient's stomach, it may be combined with the pil. galban. comp., the pil. scillæ comp., with a little prepared chalk if there be a disposition to diarrhœa, or with a minute quantity of opium or opiate confection.

Chalybeates, though in a less degree, possess the same alterative power over the follicles as mercurials, and united with their tonic properties afford a means of cure applicable to another combination of circumstances: as for instance, when there exists a general torpor and coldness of the system, with much pale urine; when the patient is thin, pale, and weak, with a withered look, a peculiar dry state of the skin, and a small weak pulse, the appetite variable and capricious, the bowels

slow, though easily regulated, and the evacuations always of a remarkably dark colour, like mahogany, or almost black; or when the patient is pale, bloated, and chlorotic; in all such cases chalybeates are very useful remedies. The most suitable preparations are the sulph. ferri combined with pulv. aloes; the ferum tartarizatum or ammoniatum with rhubarb, or the carbonas ferri with rhubarb and soda. It has been observed in these cases, contrary to what happens in general, that chalybeates, instead of rendering the fæces darker, restore them to their natural colour, an observation which is in accordance with the experience of Nehr and Heidler, of the action of the mineral water of Marienbad.

Kämpf's method consisted in injecting frequent small enemata of strong decoctions of plants which he supposed to be endowed with resolving powers, as *turaxacum*, *saponaria*, *melilotus*, and such-like; these he allowed to be absorbed from the intestines.

It is always desirable, as far as the case admits, to combine some tonic with the corrective treatment, and, as soon as the evacuations have assumed a healthy appearance, it may always be attempted. Chalybeates, as already observed, answer this purpose best; but when they are not admissible, or after their use, tar-water, lime-water, infusion of cascarrilla, nitric or nitro-muriatic, or muriatic acids, are very useful remedies.

It is unnecessary to observe that this direct method of cure must be assisted by all those means which tend to the improvement of the general health, and which at the same time correct and avoid those habits which form the predisposing causes of the disease. Amongst these the state of the skin deserves particular attention. The warm sea-water bath, the cold sea-bath, the cold shower-bath, cold sponging with vinegar and water, or salt and water, friction with a flannel glove, warm clothing, preserving the feet dry and warm, will be found most useful auxiliaries.

But a remedy superior to any or even all of these, we have found in mineral waters, by which every intention of the medical treatment, corrective as well as tonic, we have seen more efficiently, more fully, and more surely accomplished than by any other combination of remedies. Some of the most surprising cures effected by mineral waters have been chiefly in affections of this nature, as has been observed at Carlsbad by Becher, at Marienbad by Heidler, in the waters of the Pyrenees by Bordeu, at Pymont by Marcand, and also at Eger and Harrowgate.

III. COLONIC DYSPEPSIA.

The functions of the large intestines being chiefly disordered.

Alvine excretion forms so important a part of the function of digestion, that, in common language, the term indigestion is exclusively appropriated to the disorder of that function; and if it be impeded, interrupted, or otherwise deranged, it is rare that its other processes continue to be healthily performed. There

may be some exceptions to this, as in the extreme cases mentioned by Heberden, where one person was in the habit of having his bowels relieved only once every month, and another person twelve times every day, yet both with the enjoyment of perfect health; and in all persons, what is called the regularity of the bowels admits a certain latitude; but in ordinary circumstances the right performance of excretion is so essential to the health of the whole function of digestion, than any serious or long-continued irregularity of the bowels invariably leads to its disorder. We cannot, therefore, be said to have exceeded the limits of our definition in considering disorders of the functions of the large intestines as constituting species of dyspepsia.

The large intestines are very frequently, indeed most frequently, the part of the apparatus of digestion of which the functions are the first disordered; and the symptoms of their disorder often present the first perceptible link of the chain of the disorder of the whole apparatus; and though ultimately their disorder necessarily involves the whole apparatus, their derangement may so entirely predominate, that the healthy or unhealthy state of the other processes follows as a mere consequence of the state of the large intestines.

The disordered functions of the large intestines, considered only in reference to the part which they perform in digestion, without regard to the more positive diseases of which they may be the seat, are of themselves a source of great discomfort to the patient; but they deserve most consideration as being the medium through which the greater number of the disorders of the function of digestion become established, not only directly, by the impediment which they present to the function of the stomach and small intestines, but indirectly, by the stomach being made the recipient of the medicines which are necessary for their relief. The disordered function of the large intestines may, therefore, be considered as the means by which most of the noxious causes which disturb the healthy function of digestion produce their effect, and the principal secondary cause by which they extend their mischievous consequences.

The disordered functions of the large intestines afford almost the first symptoms of the derangements of the stomach and small intestines, which attract the attention of the patient, and have not seldom been improperly treated as a dyspeptic state of the stomach itself. This, as Dr. G. D. Yeats very justly observes, is not remarkable, it being recollected that the great arch of the colon lies close upon the stomach, whence a swelling or puffiness in the one may easily, without due care, be attributed to the other.

As long as the disorders of the large intestines continue to predominate over the disorders of the other parts concerned in the function of digestion, they have their own symptoms, and demand their own method of cure. When they have induced the disorder of the whole function, it is always important to know where

the error originated; and as their disorders may be mistaken for those of other organs, it is necessary that a distinction should be made between them. Under every consideration, as the disorders of the functions of the large intestines admit of being ascertained, so they deserve being made a subject of special attention.

Like the other organs of the apparatus of digestion, the large intestines may be deranged in different ways; they may be disordered from atony, from morbid irritability, from inflammation of their mucous membrane, from disorder of its follicles; all which morbid conditions afford the means of dividing colonic dyspepsia into a corresponding number of species.

I.—*Atonic colonic dyspepsia.*

Synonyms.—Obstipatio debiliū, *Cullen*; mimoses; acute disorder of the general health, *Marshall Hall*; celiacus affectus, *Celsus*; colica stercorea, *Etmuller*; colica flatulenta, *Sennertus*; lien verberans, *Bonetus*; stridulous affection of the bowels, *Bradley*;^{*} tenesmus à scybalis; dysodia stomachalis, *Sauvages*; excrementitious plethora, *Barlow*.

General character.—Bowels habitually confined, but alvine evacuations not remarkably altered; pain or uneasiness in some part of the colon, variable in degree, situation, and constancy; often stridulous noise in the abdomen.

Though costiveness is the leading symptom of this disease, it would be a mistake to suppose that it consisted in costiveness alone, or that constipation of the bowels was the only symptom which an atonic state of the colon gave rise to.

Form of disease.—This disease is not confined exclusively to either sex; it is most common in young females, and in delicate boys or young men. After there has existed for some time an habitually confined state of bowels, or a morbid state of them, in which, though evacuations occur daily, they are scanty and insufficient, the patient appears slowly and imperceptibly to fall out of health; but it is some time—several months, even years—before his ailments attract serious attention. The patient has no marked or distinct complaint, but the appetite is impaired, there is lassitude, loss of strength, weariness after any bodily exertion, a general, sometimes painful feeling of weakness, an aching over the whole body, or very distressing pains in the loins and lower extremities, attended with some degree of torpor, especially on walking or long standing; and hence the patient is constantly constrained to sit down or to rest on a sofa. There is frequent headach, great nervousness or susceptibility of impression, a tendency to perspiration on the least surprise or exertion, fluttering, faintishness, timidity, discomposure by the least hurry or agitation, sometimes tremor and vertigo. At first there is no loss of flesh, but the skin grows coarse, the countenance puffed and bloated, the complexion dull, foul,

and greasy, and the lower eyelid becomes dark, sallow, or otherwise discoloured. But as the disease continues, there is considerable loss of flesh; the complexion loses its colour and turns pale, sometimes dead-pale, sometimes swarthy pale, sometimes rather chlorotic; the countenance becomes thin, the features sharp, and the lips, more especially the upper lip, are sensibly paler than any other part of the face; the surface of the face is somewhat shining and glossy, or is frequently affected with a slight degree of clammy or oily perspiration, especially about the nose; and the orifices of the sebaceous follicles appear as small black points disseminated over the surface; and the discoloration under the eye increases to sallowness or a greenish black colour.

Pain is frequently complained of in some part of the colon, which, when it exists in an aggravated form, is various and irregular in its situation, course, degree, and duration; its approach is sometimes sudden, often slow and progressive; at first it is apt to change its situation from one side to the other, or from one part of the colon to another, and frequently appears to move up the chest or to the back, but by degrees it becomes more permanent in its situation; it is commonly observed in one of the iliac regions, frequently in the right iliac region in the course of the ascending colon, in which situation the pain on some occasions becomes very acute, aggravated by violent spasms returning in paroxysms, and not rarely attended by vomiting and great irritability of stomach, (the *colica stercorea* of some authors,) often the forerunner of stercoraceous tumours, and ultimately of that disease which has been described by Dupuytren under the name of phlegmonous tumours of the right iliac region, and which has been recently well described by Mr. Ferral.* A common situation of the pain is in the left side just under the false ribs, and very often in the left iliac region in the course of the sigmoid flexure of the colon; in this last situation it is occasionally attended with a frequent desire to go to stool, accompanied with distressing tenesmus. Frequent though ineffectual efforts are made to obtain a stool for several days, and at length a number of small hardened and slimy lumps, or scybala, either separately or connected together, similar to sheep's dung, more rarely of a flattened or tape-like form, will be voided, sometimes preceded and sometimes succeeded by liquid and sanious stools of various colours and of a frothy consistence, always extremely offensive. This is the *tenesmus à scybalis* of some authors, and the dysentery of others, of which inflammation and ultimately ulceration of the mucous membrane, and occasionally stricture of the lower part of the colon, are the remote consequences. On some occasions the pain and soreness is felt about the middle and lower part of the hypogastrium; and a slight pain is also experienced on micturition. Sometimes there may be per-

* Observations on a Stridulous Affection of the Bowels. London, 1818.

* Edin. Med. and Surgical Journal, 1831.

ceived in the course of the colon a distinct hardness or tumour, which appears to arise from a loaded state of the intestine; an occurrence particularly apt to take place in females, and more especially in the left iliac region. When the disease has made some progress, the hypogastrium is generally swollen, especially in the evening and fore-part of the night, but in the morning the enlargement has nearly or altogether vanished, in some cases leaving a degree of soreness in that region.

One of the most common and most distressing, as well as unpleasant attendants of this complaint is a disagreeable noise not unlike the croaking of a frog heard in the bowels, proceeding more especially from the left side. This noise is very much under the influence of respiration, and also any state of excitement. For the most part, especially on inspiration, it is similar to the croaking of a frog; but on expiration it is somewhat less so, conveying the idea of the sound issuing, as it were, from water; often before it ceases, it is like the plaintive sound of a dying animal. *Dicitur genere de turture, τέρζειν et τρούζειν.* At every act of inspiration, on laying the hand on the left umbilical region about two inches or two inches and a half from the navel in a transverse direction towards the spine of the ilium, a sensation is felt as if some liquid was forcibly spirted or dashed against the peritoneum; on expiration this is less perceptible. This curious verberation is not always confined to the same part of the abdomen, as it will often be found two and a half or three inches from the navel in the direction of the spleen. During its presence the patient seldom complains either of pain in the part or on any moderate pressure, or even from change of posture; but if the part be suddenly pushed by a moderate force, great pain is often felt in the region of the stomach, so much as to cause fainting, a circumstance which more particularly happens when the pulsation approaches the epigastrium. At first this stridulous noise returns at uncertain intervals in the course of the day, and is of no limited duration. The period of its continuance, however, seldom exceeds twenty minutes or half an hour; it is particularly marked whilst the patient is in an erect posture; on lying down it will almost instantly cease, and be no more heard as long as the body continues in an horizontal posture. Whatever is taken into the stomach, whilst the body is erect, has no inconsiderable influence in exciting or abating this stridulous sound. For instance, after the patient has sat down to a meal and taken a few mouthfuls, it will almost invariably ensue, and continue for some time, after which it becomes weaker, and intermits more and more till it ceases. In other cases, however, instead of food producing this effect, it oftener abates this noise, especially when the stomach is empty, and there is faintness and a sense of craving for food. In the advanced stage of the complaint, the noise frequently returns, even while the patient remains in the horizontal position. The varied state of the bowels seems to have

little influence either in augmenting or diminishing the noise in the abdomen.

If the state of the organic functions be inquired into, they will be found to betray a considerable deviation from the state of health. The appetite is generally impaired, sometimes to loathing, but frequently without any symptom of gastric or duodenal dyspepsia; sometimes there is a remarkable irritability of the stomach, the patient throwing up part of the little nourishment taken immediately on swallowing it; and this vomiting is often attended with pain or uneasiness in, or tightness across, the stomach; sometimes there is faintness with a sense of craving for food. The tongue always presents an unhealthy appearance, almost invariably it is loaded or covered with a white slimy fur; sometimes it will be found coated with a whitish fur, inclining to a yellowish tinge, and often dappled towards the root, especially of a morning; occasionally for a few days this incrustation is diminished, and the patient is more disposed for food, but this change is of short duration. Frequently the tongue is loaded, swollen, and œdematous, and marked by pressure against the contiguous teeth; it is frequently so large in proportion to the mouth, that from compression it is found more or less divided with sulci or folded into plaits. The teeth and mouth are foul; the gums also are frequently coated and palish; the inside of the cheeks, like the tongue, is often impressed by pressure against the teeth; a vitiated taste is sometimes perceived, particularly in the morning; the saliva is viscid, the breath tainted and fetid, sometimes emitting a heavy strong smell, not unlike roasted meat, sometimes a putrid, even stercoraceous odour. The bowels are at first always constipated, afterwards constipation and diarrhoea occasionally alternate; in advanced cases the latter state becomes permanent. The fæces at first exhibit in general no unnatural appearance, except that they are scanty and indurated; afterwards they are occasionally fluid, scanty, dark-coloured, and extremely fetid, often accompanied with mucus and even blood; sometimes, as already observed, they are attended with tenesmus, bloody stools, and pain in the right iliac region, an occurrence very common in young females. In the commencement the urine is high-coloured and apt to be loaded, depositing a whitish sediment, and presenting a supernatant iridescent pellicle; afterwards it lets fall a mucous deposit, sometimes of a lateritious tinge; during the continuance of the disease the urine frequently becomes limpid, but slight exasperations of the complaint restore the deposit. The pulse is frequently nearly natural; sometimes it is quick or easily accelerated, or variable, and apt to become irregular and intermitting; it is usually soft and weak, sometimes small; it varies in point of fulness, and continues to increase slowly in frequency as the complaint advances. The skin is in general cool, rather moist and clammy, particularly the hands and feet, which are apt to be obstinately cold; the fingers are rather livid, and the nails assume a lilac hue.

It is remarked by Dr. M. Hall, from whose exact portrait of this complaint we have drawn a considerable part of our description of it, that the condition of the countenance, the tongue, internal mouth, and general surface, is peculiarly constant and uniform in almost every case and every period of the disease, but that the other symptoms are characteristically inconstant and variable.

These symptoms are—an unaccountable sensation of weakness and weariness, the patient suffering from a sense of aching after slight exertion; a considerable loss of strength, sometimes amounting to faintishness in the upright posture, with a peculiar sense of fluttering at the heart and pit of the stomach; but the most frequent subjects of complaint are headach, vertigo, and nervousness. The headach, which is severe on rising from bed in the morning, inasmuch so as sometimes to excite vomiting, will continue unabated for an hour or two, and is often proportionate to the degree and length of time which the patient has slept. The patient is flurried by the least hurry, agitation, or excitement, is very frequently affected with nervous tremor on the least surprise or least exertion, frequently manifested in a quivering of the lip or dimpling of the chin on speaking, or, when at all agitated, by tremor on holding out the hand, or carrying a cup of tea to the mouth, on attempting to stand or walk, or on being fatigued or hurried. Sometimes there is oppression, heavy sleep, or considerable stupor or obtuseness of intellect during the day, and during the night great wakefulness and restlessness, disturbed sleep, dreams, and incubus.

The patient is liable to violent and sudden attacks, generally induced by some improper article of diet or a more than usually loaded state of the large intestines, such as sickness, vertigo, faintishness with cold perspirations, paleness of the countenance, and coldness of the extremities. These attacks are sometimes accompanied with spasmodic or convulsive paroxysms, frequently assuming the form of hysteria, more rarely of epilepsy, and occasionally temporary delirium, loss of memory, or absence of mind. Sometimes the attacks consist of spasmodic or anomalous pains about the heart or side, or in various parts of the abdomen; in fluttering, irregular action, violent palpitation of the heart, with syncope; in local pains more or less severe, occasionally so severe as to resemble *tic douloureux*, of longer or shorter duration, and in various forms and situations; in some cases resembling the passage of gallstones, in others inflammation of the pleura, of the liver, spleen, kidneys, and intestines or peritoneum, and affections of the bladder. Sometimes there is an extraordinary loss of muscular power, especially of the lower extremities, which are so enfeebled as to appear affected with paralysis.

Curvature of the spine is not a rare complication and consequence of this disease, more especially in scrofulous constitutions. Its approach is very gradual, and long before any deformity can be observed, on forcibly pressing with the fingers on each side of the spinous

processes of the third or fourth lumbar vertebra, considerable pain will generally be excited, inasmuch as occasionally to produce a degree of sickness. The seat of this pain is, however, confined to no exact point. After a considerable time the patient experiences a further increase of weakness and derangement of the general health, and the spine, at the place above mentioned, will now be found giving way, either slightly projecting anteriorly or to the left side. In consequence of the curvature of the spine to the left side, the right hip has the appearance of being enlarged, by reason of the hollowness between the iliac and vertebral column being increased, whilst the left hypogastric region is more swollen than the right.

Dr. Bradley conceives that the disease of the spine is the primary affection, of which the stridulous sound and other derangements are only the consequences. We confess that to us his reasoning presents a very remarkable instance of a false induction; for on his own admission there is no constancy of conjunction between the affection of the spine and the stridulous noise, as every practitioner must be able to confirm. They are both accidents of a more general disorder, only connected together through their common cause.

Causes.—A certain period of life from the age of ten to thirty seems very much to favour the formation of this disease. It may be partly connected with the natural conformation of the body and the development of the constitution at this particular time of life; but perhaps it is more strictly dependent upon the change of habits coincident with it in the children of the rich, who are either unremittingly occupied with their omnifarious education, or, to obtain a graceful carriage, steadfastly confined to one posture, the undeviating sedentariness of the body presenting a remarkable contrast to the desultory activity of the mind; and in the children of the poor, who are of necessity obliged to seek their bread in the sedentary occupations of needlework, in the tedious and wearisomeness of manufactories, at the tambour, the stocking or the lace-frame. Hence females, who are under boarding-school discipline, and rigidly subject to it, being compelled to sit many hours of the day with the head erect and the shoulders thrown forward, are liable to this disease; hence governesses, sempstresses, milliners, mantua-makers, students, and all persons of sedentary and inactive occupations, are the chief sufferers from it. The effect of sedentariness is increased by any causes which have a relaxing influence upon the body; and hence the confined or impure air of apartments, the warm relaxing vapoury air of some occupations, as that which arises from working over ironing-stoves, or from the steam-engines of manufactories. But every circumstance which tends in any way directly or indirectly to impede the evacuation of the bowels is the most influential cause of this complaint. Hence not lending a ready obedience to the calls of nature, which often arises in children from indolence of habit, but more frequently from being placed in situations where their modesty checks them

in doing so, and, at a later period of life, from the unbending restraint and thralldom of society; or amid the fatigue, care, and anxiety of life, from neglecting a due attention to the state of the body.

Pathology.—The explanation of the nature of this disease presents no difficulty. That it consists in a state of atony and insensibility of the colon, the most probable consequence of habitual over-distention of its muscular fibres, there seems to be little reason to doubt. The symptoms may be clearly and distinctly traced to this morbid condition of the colon, with which also it seems easy to connect the disorder of the general health which ensues. For, sometimes by continuity, sometimes by sympathy, deranging the function of gastric and duodenal digestion, sometimes by defective excretion changing the state of the circulating fluid and interfering with the process of nutrition, sometimes by the sympathetic irritation of distention disturbing the functions of the nervous system, and by pressure impeding the circulation in the abdomen, (from which cause and continuity, the functions of the womb and pelvic viscera become disordered, and the spine loses the support of the antagonist muscles,) it seems all-sufficient for the effects which we attribute to it.

When the disorder of the colon is secondary, supervening upon gastric or duodenal dyspepsia, it appears to be merely a degree of languor or sluggishness in the bowel causing delay in the passage of its contents, the consequence of the bile and other secretions being less adapted to support its action; but when its contents are longer delayed than usual, they become hardened, and irritate the surface of the intestine, causing tenderness on pressure, a feeling of hardness in the part, and all the symptoms of colonic disorder already described.

Treatment.—The indications for directing the method of cure are, *a.* to remove any accumulation of feces by having the bowels fully and satisfactorily evacuated; *b.* to facilitate and promote the regular performance of the function of the colon; and, *c.* to correct the morbid condition of the colon, the proximate cause of the disease.

a. For fulfilling this indication purgatives cannot be dispensed with; but though constipation is a constant attendant of this disease, they are not to be given with an unsparing hand. Rhubarb, combined with sal polychrest and a little ginger, the pulvis scammoniae comp. followed at a proper interval, if necessary, by a little infusion of senna, are the best description of purgatives. If the bowels are not easily acted upon, it is a bad practice to continue throwing in without discrimination any description of purgatives without allowing sufficient time for moderate doses to act. Mercurials are unnecessary unless the alvine evacuation does not resume its proper colour by means of the other class of aperients.

b. This indication may be fulfilled by the daily use of the warm-water lavement, and, if necessary, by some mild aperient medicines, just suffi-

cient to solicit the bowels without irritating them. The object should be to induce a full and consistent evacuation daily, avoiding as much as possible the fretting and painful operation of medicines by which the bowels are irritated. On the other hand, the power of the aperient must not be less than equal to obtaining a complete evacuation of the bowels; scanty evacuations will not suffice. Whilst, therefore, too considerable and too often repeated doses of medicines are to be guarded against, ineffectual medicines are equally to be avoided. Good forms of aperients are the pulv. aloes comp., decoct. aloes comp., or baume de vie in pimento water; a pill composed of equal parts of ext. colocynth. comp. and extract. hyoscyami: three, four, or five grains of this composition may be occasionally taken. The following formula affords a useful pill:—
R. pulv. aloes, pulv. gambog. saponis, ext. hyoscyami $\bar{a}\bar{a}$ 3 i. fiant pilulæ xx. Una vel duæ horâ somni sum.

Though the use of the warm-water injections in the loaded state of the bowels is frequently attended with pain in the course of the colon, or though they may not be at first successful, yet a perseverance in their use generally overcomes these obstacles and occasionally restores the natural and spontaneous action of the bowels: by preventing the constant distention by accumulated feces, the opportunity is afforded the intestine of resuming its tone and sensibility. But whether clysmata or aperients are used for relieving the bowels, opportunity should be from time to time afforded for their natural action, by leaving off, or gradually diminishing, the medicines.

The diet should be mild, light, and nutritious, taken in moderate quantities and frequently, not less than three or four small meals daily, for the frequency of the meal appears to have a considerable effect in promoting the action of the bowels. It should consist of mild animal food, boiled or roasted, and should be well masticated; mutton, chicken, beef less frequently; stale pure bread untoasted, mealy potatoes mashed, tea or coffee in moderate quantities. We have not known much advantage from using more aperient kinds of food, as fruits, figs, medlars, stewed plumbs, stewed apples, brown bread, oatmeal porridge, and such-like. They generally disorder the first processes of digestion.

The function of the bowels will be also promoted by a system of regular walking exercise, apportioned to the strength; but violent efforts and fatigue are injurious. Sometimes easy, lounging exercise, with complete relaxation of mind, has considerable effect in promoting the evacuation of the bowels.

c. The means of fulfilling this indication are partly direct, partly indirect.

1. When the bowels have been preserved in a soluble state, the use of tonics or chalybeates may be advisable for correcting the morbid condition of the bowels. When chalybeates have a tendency to keep the bowels open without causing griping, they are often of great

service, and we have had frequent opportunities of observing the superiority of the chalybeate mineral waters in this respect over the official chalybeates. But the state of the tongue must always be the guide for administering tonics, for as long as this is considerably furred, the most effectual means for removing such fur will prove the best tonic, and the utility of any tonic may be estimated by the return of appetite; therefore any stomachic tonic which does not effect its purpose by removing the fur is injurious.

Friction over the bowels with the flannel glove or flesh-brush, the galvanic circuit passed through the bowels and daily repeated, and in obstinate cases an occasional blister, are also direct means having the same effect in different degrees. But of all external means we have known the greatest service from the warm or cold douche upon the abdomen, continued for a month or six weeks, as so commonly practised in Italy.

2. The indirect means are sea-bathing, sponging the body with salt water or vinegar and water cold; change of air; country air; travelling; warm clothing; preserving the feet dry; relaxation from study, occupation, and business.

II.—*Inflammatory colonic dyspepsia.*

Synonyms.—Κοιλιακή, *Græcorum*; ventriculosa passio, *Cæl. Aurel.*; enteritis colica, colica phlogistica, *Sauvages*.

General character.—Pain in some part of the colon, prevailing most in one particular point, felt always more before an evacuation of the bowels, seldom increased on pressure; stools generally liquid, rarely formed, not always more frequent than natural.

Form of disease.—We wish, without encroaching upon the subject of diarrhoea or dysentery, to characterise by this term a disorder of the function of excretion arising from chronic or sub-acute inflammation of the colon. This complaint is manifested by pain in some part of the colon and by sense of extreme weakness or of fainting after an evacuation of the bowels. The patient is always remarkably lowered, irritated, or made otherwise uncomfortable by the action of purgative medicine, and even by the spontaneous action of the bowels, which is always followed by more or less feeling of exhaustion; he feels always most strong and most comfortable when his bowels are confined. Sometimes the pain or uneasiness extends over the whole abdomen, and there is also a certain degree of tenderness and an increased heat of the part; but more commonly the pain is referred to particular points of the colon, to which it is more or less confined—frequently to the caput cæcum coli and the ascending colon; sometimes to the arch of the colon; in young women to the sigmoid flexure. The pains of the colon are accompanied with a pulse somewhat accelerated and rather tense; there is some degree of thirst, but seldom much heat of surface. The motions present an unhealthy appearance; they are seldom formed, more commonly liquid or

pultaceous; sometimes they are light-coloured, almost white, sometimes yellow and frothy, less frequently green or black; sometimes a tenacious puriform matter streaked with blood is discharged, which on some occasions alternates with healthy feculent matter, and at other times is mixed with it; the evacuations are always fetid in some degree, on some occasions most remarkably so. They are generally more frequent than natural, but often they are not so, an evacuation sometimes not occurring oftener than once in two days. The stools are frequently discharged with considerable force, but occasionally there is tenesmus without any excrementitious discharge. The appetite is seldom much impaired. The complexion is pale or whitish, sometimes of a remarkable greenish paleness, and the body emits more or less of a cadaverous smell.

The unfavourable progress of this disease is to hectic fever accompanied with œdema of the lower limbs and face, dejected features, and gradual exhaustion.

Causes.—This complaint is a common consequence of the preceding form of dyspepsia, more frequently of the medicines which have been improperly used for its cure; the effect of distention from remora of fæces, or of harsh drastic medicines. It is also on some occasions produced by the irritation of worms, and may arise from accidental colds.

Pathology.—The nature of this disease has been verified by repeated dissections, which have shewn it to consist in various degrees of inflammation of the mucous membrane of the colon, sometimes very limited in extent, frequently terminating in ulceration, occasionally in thickening or induration.

Treatment.—Leeches or cupping to the painful parts used with caution and moderation; fomentations; covering the abdomen with a flannel roller moderately tight; light, bland, pultaceous diet; milk, if it is easily digested, or asses' milk; rest of body, sometimes confinement to bed or the recumbent posture, afford the only means of relief in this complaint.

III.—*Irritable colonic dyspepsia.*

Synonyms.—'Ερεγγυαλγία τοῦ στοῦ, *Hipp.*; colica hypochondriaca, hysterica, *Sydenham*; flatulencia hypochondriaca, hysterica, *Juncker*; flatulencia convulsiva, *Sennertus*; hypochondriasis tympanitica, *And.*; colique nerveuse; enteralgie, *French*.

General character.—Intestinal digestion accompanied with pain, uneasiness in some part of the abdomen, seldom fixed to one spot, but changing its situation, and intermitting.

Form of disease.—There exists a certain morbid condition of the intestines referable only to irritability or morbid sensibility, without either proof or sign of an inflammatory state of the mucous membranes. It is certainly most frequently met with in persons of irritable and nervous temperaments, and is therefore probably a consequence of that constitutional state; but the symptoms shew that

this morbid condition is sometimes pre-eminently developed in the intestines, in which the patient is sometimes the subject of the most painful, distressing, and unnatural sensations. It is always attended with hypochondriasis, a constant watchfulness and attention to all bodily sensations, which depress and overwhelm the mind. These patients frequently complain of pain, or of a sensation of twisting at the umbilicus or in the course of the colon; occasionally of acute pain in the same situation, seldom augmented, generally relieved, by pressure; frequently a sensation of sinking or dragging of the bowels, giving the notion of the intestines falling out; some patients experience this uneasy feeling to such a degree that they are obliged to confine themselves to the recumbent posture. Sometimes, instead of pain, the patient feels in the intestines an indescribable uneasiness or peculiar sensation similar to those which are perceived in the stomach in irritable gastric dyspepsia; occasionally the pain and preternatural sensation exist together, frequently they alternate with each other.

Frequently the chief subject of complaint in this disease is flatulence, which is generally accompanied with inodorous eructations, neither acid nor putrid, with stridulous noise in the bowels, borborygmi, with colic and spasmodic pains affecting different parts of the bowels, which are sometimes accompanied with pyalism and copious discharges of limpid urine.

A very aggravated form of this complaint has been described under the term *flatulencia convulsiva*. It occurs in men, and has a strong affinity to the hysterical passion of females, the sexual organs being strongly affected. Early in our medical career we witnessed a case of this disease, the paroxysm of which a more experienced and now justly eminent physician arrested by the application of cold to the testicles.

The uneasy feelings in this disease return or are exasperated during the intestinal digestion, which is ordinarily difficult and laborious. They are frequently dissipated by travelling or agreeable occupation of the mind, and return with repose. They are sometimes, however, aggravated by the least motion, and are excited by a fit of passion, by anxiety of mind, by any disquietude, sometimes by the least effort of attention. The pains and colic often supervene upon stormy or unsettled weather. We recollect to have seen a case of this disease which co-existed with a remarkably painful sensibility of the retina.

Under these complaints the patient may preserve the appearance of health, and though the function of digestion is painful, it is yet satisfactorily performed, the nutrition being little affected, and the stools healthy, though the bowels are generally disposed to be confined.

Every form of this complaint is most obstinate, and rendered doubly so by the mutable and variable state of mind of the patient, who

is contented with no method of treatment, and is every day changing his physician. He has not patience to wait for the operation of any medicine, but is unceasingly fretting his body with every description of medicine, particularly with aperients, by which his complaints are invariably aggravated.

Pathology.—Concerning the nature of this disease we refer to our pathology of irritable gastric dyspepsia. Bonetus gives the case of a person who had this complaint, marked by great pain and rolling of the bowels, attended with a moaning sibilous noise, for three years, in consequence of plum-stones lodging in the colon.

Treatment.—The cure of this disease, always difficult to be obtained, is to be sought for by a mild bland diet, easy of digestion. If milk diet agrees, the patient should confine himself to it. He should avoid any thing heating and irritating, and should shun every form of medicine as much as possible. The bowels are to be kept soluble by the easiest means. The patient should live much in the open air, and take exercise, chiefly on horseback. Sailing, and even long sea voyages are very useful. Of direct medicines we can speak most in favour of chalybeates, and the other metallic tonics. We have known the Kesselbrunnen of Ems of considerable service, but the worst case we have known was most benefited by the artificial Pymont water.

IV.—*Follicular colonic dyspepsia.*

Synonyms.—Colica pituitosa;* scelotyrbe pituitosa;† chlorosis pituitosa;‡ diarrhæa pituitosa,§ *Auct. Var.*; arthritis chlorotica,|| *Sauvages*; paraplexia rheumatica, *Id.*; infarctus,¶ *Kämpf*; colique glaireuse, *French*.

General character.—Pain, spasm, or uneasiness in the course of the colon, with the evacuation of considerable quantities of mucus in various morbid states.

Form of disease.—In persons of sedentary habits, more frequently young persons, and most especially young females who are generally subject to costiveness and accumulation of feces in the large intestines, the mucous follicles of those organs are liable to be disordered in the way we have already explained in the section on *follicular duodenal dyspepsia*, much to the aggravation and obstinacy of the other symptoms. Like that complaint, the present disease is most usually met with in cold phlegmatic habits, and its progress is insidious. After habitual costiveness and the establishment of that state of general disorder of the health which we have already considered under *atonic colonic dyspepsia*, the patient becomes subject to acute attacks of pain or spasm in some part of the large intestines, frequently amounting

* Sennerti species tertia; *Fernel*. pathol. lib. vi. cap. 9; *Salmuth*. centur. i. obs. 78. *Bonet*. Sepulchret. obs. 23.

† *Percy* winger.

‡ *Sauvages*.

§ *Id.*

|| *Musgrave*.

¶ *Etmuller*, p. 440.

to regular paroxysms of colic. The pain is occasionally confined to one particular part of the colon, frequently the ascending colon and the sigmoid flexure. Relief of these pains is only obtained by copious discharges of mucus in some of the various morbid forms already described. Etmuller has observed that the pain in this species of colic is more confined to one part of the abdomen, and conveys the feeling of a perforating or transfixing pain. But instead of this direct symptom of disorder, it is not unusual for the patient to be seized with a violent nervous affection. Children are frequently seized with convulsions, to which succeed chorea, and sometimes paralysis of the limbs. Young women in this complaint are often affected with hysteria, which may, however, be distinguished from the idiopathic form of that disease by the great variety of ways in which it attacks the patient, sometimes as catalepsy, at other times as imbecility of mind, neuralgic affections of the heart, convulsive asthma, loss of voice, loss of speech; it very frequently leaves paralysis of some member, most commonly of the lower limbs, differing from ordinary paralysis in the sensation of the limb being seldom impaired. Painful affections of the heart, violent headach, extreme restlessness and agitation, rheumatic gout, severe pain in some part of the spine, frequently at the bottom, may be enumerated amongst the secondary affections of this disease. In women the uterine functions are always painfully performed; and it is not unusual to see a metastasis of the function to other organs, to the lungs, appearing as hemoptysis; to the stomach, as hematemesia; to the bowels, as melæna. These derangements of the natural functions are various. Generally the patient becomes pale and delicate-looking, but sometimes preserves a natural appearance, or even good looks; the skin is cool, moist, and clammy, particularly the extremities; the lips and gums are pale, and the tongue is invariably large, moist, and covered with a thin clammy coating; frequently it is swollen and œdematous, divided laterally or transversely by deep cuts or fissures, and retaining the impressions of the teeth. The bowels are always constipated, often obstinately so, the most violent medicines having little effect; but when they do act, the stools are found to be abundant, gruelly, and light-coloured, frequently deficient of their natural smell, or having a faint muskish smell, and, if mixed with water, leaving a greyish calcareous deposit: sometimes they are extremely fetid. Occasionally the stools are mixed with shreds of membranous substance, or with mucus in various morbid states and forms, frequently in perfect tubes, some of which have been observed full half a yard in length; an appearance which has not rarely imposed upon the ignorant the belief that a portion of the intestines has been actually discharged. The urine is extremely variable, being sometimes scanty and loaded, almost deficient, at other times copious and limpid like water. The pulse, except under the excite-

ment of any violent attack, is always weak, small, and soft, generally slow; the circulation seems hardly to arrive at the system of the capillary vessels.

Pathology.—Under *follicular duodenal dyspepsia* we have already sufficiently inquired into the nature of the morbid condition of the mucous membranes which constitutes the proximate cause of this disease; a condition in which their surfaces are deprived both of their secreting and absorbing function as well as of their natural sensibility, their vessels losing their permeability, and becoming, as it were, impacted and blocked up with viscid or concrete mucus—*emphragma mucosum*. This state is the consequence of the membranes either from atony or inflammation losing the power of throwing off the mucus from their surface, and which, either accumulating or concreting in the follicles, gives rise to considerable tumours there; or, collecting, forms itself into the various forms of excreted matters already noticed. This unhealthy state of the mucous membranes, the consequence of a depraved function of secretion, is the proximate cause of many painful, even dangerous diseases, arising as well from the disordered function of the membrane as from the irritation of such unnatural substances in the alimentary canal, inducing different symptoms corresponding with the different situations they may occupy. The most common cause of this state is the habitual costiveness of sedentary persons, or the repeated irritation of the alimentary canal by crude and indigestible articles of food; but we have known it to be produced quite independently of these by the long-continued use of laxative medicines, and these by no means of the most irritating kind.

Treatment.—For the general treatment of this complaint we must refer to the corresponding form of duodenal dyspepsia. We have only to observe that, as a purgative for evacuating these *infarctus*, we have found the oleum terebinthinæ superior to any other.

IV. GASTRO-ENTERIC DYSPEPSIA.

The disorder affecting the function of more than one organ of the apparatus of digestion.

The preceding orders present dyspepsia in the simplest forms in which it is capable of existing, either such as it has been observed to assume, or to which it may be reduced by a careful classification of its causes, its symptoms, and its remedies. It is, however, neither pretended nor meant to be understood that it is met with always in these definite forms. In diseases there is nothing absolutely definite. They are not like animals or plants, each of which, nature, to preserve the integrity of the species, has surrounded with a distinct barrier. In strictness of language, diseases may be described, but cannot be defined. They pass so gradually into one another, that all the pathologist can hope to attain is to mark their leading and most constant phenomena. In describing the different forms under which dyspepsia presents itself, this is all that we have

either sought or professed to do; and though we are too well aware that not only the species or forms of the different orders, but that even the species of the same order, may be complicated with each other, we venture to assert that, however intimately the different species may be combined together, it is seldom that one will not be found predominating. A knowledge, therefore, of the elementary forms of dyspepsia gives the physician a most commanding advantage even in cases the most complex; enables him to decompose and unravel their complications; furnishes him with indications which, as it were, throw daylight upon his operation, simplify and assure his method of procedure, and afford him the means, if not of foreseeing, most certainly of early desecring, the effect of his remedies.

The characters which we have assigned to the different species of dyspepsia, are the result to which we have been conducted by the review of many cases in which the disease has been presented in its most simple as well as its most complicated forms, comparing the circumstances of one case with those of another, separating the constant from the contingent, referring each to the morbid condition with which it was found to be most constantly conjoined. And if any persons should be disposed to regard these morbid conditions as mere figments, or to regard the terms which represent them as mere empty words, we trust they will be reasonable enough to recollect that the name does not change the thing, and that if it serves to mark the constancy of conjunction of a group of phenomena, it matters not which word or what sign we may use for the purpose.

Were time or space allowed us, it would be the object of the present section to indicate and describe the complications of the different forms of dyspepsia, to trace the law of their combinations, and the order in which they co-exist or succeed each other;—circumstances well deserving the attention of the physician. But this task we must reserve for another occasion, and content ourselves at present with merely indicating some of the more common complications. We leave the full consideration of this part of the subject with the less reluctance, because we are convinced that a moderate attention to the elementary forms of this disease will render a description of their complications almost superfluous.

When the disorder of the function of digestion extends to the whole or to more than one organ of the apparatus—to the stomach as well as the intestines, the morbid condition may be the same throughout, or it may be dissimilar, thus giving rise to the division of *gastro-enteric dyspepsia* into what may be termed *enopathic* and *polypathic*.

The species of the first division must be necessarily limited, and determined by the morbid conditions which the organs are liable to assume. Hence they will be the four following:—

1. Atonic gastro-enteric dyspepsia.
2. Inflammatory gastro-enteric dyspepsia.
3. Irritable gastro-enteric dyspepsia.
4. Follicular gastro-enteric dyspepsia.

Even in these species it will seldom be found that the morbid condition exists in an equal degree in every organ of the apparatus; but, on the contrary, that it usually preponderates more in one than the other, thus approaching to some of the elementary species.

The second division admits of a much greater variety of species, co-extensive with the combinations into which the four morbid conditions are capable of entering. The following are those most frequently observed:—

5. *Atonic gastric with inflammatory duodenal dyspepsia*.—It is the constant tendency of long-continued dyspepsia of any form, whether it be atonic, irritable, or inflammatory, to localise itself, to attach itself to one part of the alimentary canal, which in consequence becomes the seat of morbid sensibility, morbid irritability, or of some modification of vitality, or of inflammation or some other modification of its vascularity. Dr. Wilson Philip has observed that in atonic gastric dyspepsia this occurs most frequently at the pylorus or upper part of the duodenum. Hence one of the most common forms of complicated dyspepsia is the species above indicated. It is deserving of remark that this localisation of the disease, this disposition to confine itself to one point, sometimes removes, frequently relieves, the original disease.

6. *Irritable gastric with inflammatory duodenal dyspepsia*.—This, also, is the consequence of the tendency just indicated, after irritable gastric dyspepsia has existed for a considerable time, or when it has been treated by heating or irritating remedies. It is met with commonly in persons of anxious, energetic, enthusiastic dispositions, in persons worn out and exhausted with cares, as for instance, in over-anxious mothers. The tongue is generally clean, small, and tremulous; its anterior edge of a smooth, glossy, light red colour; more rarely it is of deep red colour; or it presents a loose velvety appearance, like red plush; the lips are red, and there is a frothy saliva in the mouth. The patient complains of an uneasy gnawing sensation, a sense of fainting or sinking at the pit of the stomach; sometimes there is a constant excruciating pain in that situation. The uneasy feelings are much increased by medicines; they invariably irritate, produce discomfort, or disturb the digestion. The pulse is generally quick, wiry, and small, the skin dry and harsh, particularly the palms of the hand, which are rough; the urine is alternately pale and sedimentous.

7. *Inflammatory gastric with atonic colonic dyspepsia*.—This is a complication common in young scrofulous subjects, male as well as female.

8. *Irritable gastric with atonic colonic dyspepsia*.—Vomiting, more especially after meals, is the most leading symptom of this complication. It appears to arise from pressure of the loaded colon upon the stomach.

Of the complications of the different morbid conditions in the same organ of the apparatus of digestion, we must also reserve the consideration for another opportunity.

The only apology we have to offer for having occupied so large a share of the time and attention of the reader, is the importance properly attached to the disease which is the subject of the present article; for if considered in its almost universal prevalence and in its remote consequences, it is the source of more suffering to man than any other to which by his physical nature he is exposed, and, therefore, ought to precede all others in its claims upon the attention of the physician. It is, indeed, a very egregious mistake to imagine that this opinion, which attributes health to a pure digestion, and every species of disease to its disorders, is one of recent growth. It is one which has been sanctioned by the experience of the greatest physicians of every age and country. To the greatest of them all the healthy state of the function of digestion seemed so important, that he has not hesitated to declare, if not exactly in so many words, certainly in equivalent terms, that he who shall have discovered the means of a healthy digestion (which he considered to consist in the exact adjustment of food and labour,) shall have discovered the great secret of health: *ἢν μὲν γὰρ ἦν εὐεστὸν ἐπὶ ταυτοῖς, πρὸς ἑκάστην φύσιν, σίτου μέτρον, καὶ πόσιν ἀειθμὴς, μὴ ἔχον ὑπερβολὴν, μήτε ἐπὶ τὸ πλεόν, μήτε ἐπὶ τὸ ἔλαστον, εὖροιο ἀν' ὑγίει τοῖσιν ἀνθρώποισιν ἀκριβὴς.** In this respect Aretæus has gone a step beyond the father of physic; for to a healthy digestion he not only attributes health of body, but also health of mind: *στόμαχος ἡδονῆς καὶ ἀνδρείας ἡγαλμῶν καρδίας καλοῖον γειτόνευμα, ἐς τόνον καὶ θυμὸν ἡ ἀθυμίαν, τῆς ψυχῆς συμπαθεῖν ἥδε στομάχου πρῶτιστα δύναμις.†* And to give this opinion only its full extent, we may add with all propriety, that sweetness of temper, clearness of intellect, vigour of understanding, correctness of judgment, firmness of character, power of self-control, are preserved by a healthy state of the digestive organs, and may be lost by their disorder; for as it is by the diseases of these organs that intemperance works its mischief, all that sages, all that philosophers have delivered in praise of the virtue of temperance, may, without stretching a point, be fairly predicated of the healthy state of the function of digestion. When will legislators stoop to consider, or when shall legislators be made to comprehend, the influence of physical causes upon moral conduct?

The state of the digestive organs has the greatest influence upon the state of the other organs of the body. Their disorders are frequently the cause, frequently the consequence, of the disorders of other organs. "Sur dix cas de maladies aiguës," says one of the most distinguished pathologists of the present day, "qui ont leur point de départ ailleurs que dans le tube digestif, il en est huit à-peu-près dans lesquelles on observe un dérangement plus ou moins prononcé, soit dans la texture, soit dans les fonctions du canal intestinal. Dans les maladies chroniques, quelle qu'en

soit la nature, il est infiniment rare que le tube digestif ne subisse pas quelque alteration."* A similar opinion had been expressed by Cullen: "I am of opinion that we cannot bestow too much pains on the consideration of the affections of the stomach, as we find that, next to the pyrexia, they are the most frequent occurrences in practice." From these statements we might learn, did we not all already know, that there is scarcely a disease which afflicts the human body that can be correctly treated if the nature of the diseases of the digestive organs be not properly understood; and we may infer how much the difficulty of their treatment is increased, when, as Aretæus observes, the means which restore the health and recruit the strength in other diseases, are noxious in these: *ἡ ἐν τοῖς ἀλλοιοσι πάθει, μετὰ τὴν θεραπείην δάιντα ἐς ἰσχὺν καὶ κράτος τοῦ σώματος εὐπεψία ἀγαθή· στομαχομοῖσι δὲ μόνους ἥδε γίνεται πωλημελής.†* A thorough knowledge of dyspepsia in all its forms and varieties may therefore justly be considered the key to the cure of many acute and of most chronic diseases.

The mischief which springs from the disorders of the function of digestion is not limited to the individual—it extends to the offspring; for the disposition to these diseases being hereditary and increasing in virulence as it descends, the dyspepsia of one generation becomes scrofula, consumption, or some other malignant disease in the succeeding ones; hence the decay and extinction of families, and all the manifold attendant miseries. When will parents, besides, if not before, wealth and honours, think of bequeathing health to their children?

Moreover, as the diseases of the function of digestion may be said to belong peculiarly, if not exclusively, to a state of civilization, following it as closely as the body is followed by its shadow, they may be considered as the physical process by which luxury and refinement work the deterioration of the species, and prepare its decay—the under-current, which, setting against, stays or frustrates the progress of society. When will the physical state of the body cease to be deemed an unworthy means of promoting our moral—our religious improvement?

(T. J. Todd.)

INDURATION, (*induratio*, from *indurare*, to become hard.) This term is employed to designate an increase in the natural consistence of organs, in contradistinction to that of *softening*, which is used to denote the opposite state, or a diminution of the same property.

GENERAL PATHOLOGY OF INDURATION.

I. *Physiological modifications of consistence.*—In order to form an accurate estimate of the modifications which take place in the consistence of tissues or organs in a state of disease, it is essentially necessary to possess an accurate knowledge of the degree of con-

* De diætâ, lib. i. sect. 3.

† De causis et signis diuturn. morb. lib. ii.

* Andral, Anatom. Patholog.

† De curatione diuturn. morb. lib. ii.

sistence which these tissues or organs respectively possess in the normal state, as well as of the remarkable modifications which this property manifests not only in the different periods of life, but also during the progressive development of animal organization. The changes of consistence which are observed to take place under these different circumstances, although sometimes great in degree and extent, are nevertheless to be regarded as physiological conditions, and which mark in a particular manner the intermediate stages and extremes of life. Thus, when the phenomena of organization are about to manifest themselves in the impregnated ovum, nothing is discovered but a colourless liquid; organs when first perceived in the embryo are a mere jelly; and during their development, and in proportion as they approach to the perfect state, do they acquire a gradual increase of consistence. This progressive increase of consistence keeps pace with their development, and does not acquire that degree which belongs to each tissue or organ in particular, until it has arrived at a perfect state of formation. Now, we cannot but perceive here that the degrees of consistence must serve some important end; that even the almost fluid state of parts is not to be looked upon as a mere consequence either of an entire want or of an imperfect state of organization, but that it is a condition of organs or of the materials of which they are composed, subservient—if we may so speak—to the elementary acts of life; a condition which facilitates the transitions of form which organs must present before they can attain their more permanent and perfect state. By means of this condition of organs, whether transitory or permanent, nutritive elements subservient to growth and development find a nidus fitted for their reception, and fluids every facility for passing in whatever direction they are wanted; organs are moulded to the forms of the parts destined to receive and protect them; and numerous relations of bulk, position, situation, &c. are reciprocally adjusted between the containing and contained parts, as the changes which they undergo may render it necessary, in order to maintain the integrity and secure the well-being of each.

At the different periods of life, infancy, manhood, and old age, the consistence of the various tissues of the body, and consequently of organs, present great variety. In the first they are soft, spongy, largely embued with fluids, easily torn or broken; in the second, firm, more compact; the fluids are less abundant, and the solids resist considerable efforts to tear or break them. In the last period, the proportion of fluids is still less, and the solids have arrived at their maximum of density and cohesion.

The consistence of organs varies likewise according to sex, constitution, and the various conditions of life in which the individual has been placed. The difference of consistence arising out of these states is, however, by no means equally marked in all, and least as

regards sex, if we except the cutaneous and muscular systems, which, in the female, are more delicate and softer than in the male. Those states of the body which are connected with the predominance of the lymphatic system are characterized by a soft, flabby feel, the opposite of that which accompanies what is called a sanguineous temperament; and as an instance of the modifications of consistence which organs undergo in individuals submitted to the influence of external causes, we may refer to such as are the result of climate and various modes and conditions of life. The modifications of consistence, however, which depend on sex, constitution, or conditions of life, are, perhaps, never so great as to be confounded with those which constitute morbid states of this property of organs. It is far otherwise in the different periods of life; a degree of softness or induration equal to that which characterizes even the extremes of certain pathological states, constituting the peculiar character of certain parts at the periods to which we allude. Thus, the brain of the new-born infant, the mucous membrane, and even the muscles of organic life, are so soft as to be ruptured or broken down into a pulp by a slight degree of pressure or traction, just as we find to be the case in softening of these parts from disease, in after life. On the other hand, in advanced life, the cellular tissue; membranes, particularly serous and fibrous; the muscles and tendons; bone; the brain and nervous system; and particularly the uterus and ovaries, sometimes acquire a degree of hardness equal to that which is known to be produced by certain diseases, and which, by some pathologists, has even been described as a state of scirrhus of these organs.

It may not be unimportant to observe here, that numerous modifications of consistence similar to those which take place in man at the different periods of life, are found to exist in certain parts of some kinds of animals. In them, however, it is a primary condition necessary for the accomplishment of important functions, and, generally speaking, in no way dependent on changes induced by subsequent development, as in man. The conditions to which we allude consist in an increase of consistence or a positive conversion of one tissue into another of a similar but denser kind; a change necessary to enable the animal to live in a manner suited to its wants and the place which it holds in nature. Thus, in some animals, the cellular tissue, instead of being soft, spongy, and highly extensible, is naturally firm, dense, and fibrous; the epithelium an opaque, thick covering; the sclerotic a cartilaginous or osseous case; the epidermis, a horny envelope, &c. &c. The analogous changes which take place in man constitute pathological states, and not only subvert but entirely destroy the properties and functions of the organ in which they are accidentally produced.

If the physiological changes in the consistence of organs which we have noticed are

properly understood and applied, they will serve to explain many of the pathological changes which occur in man, whether we consider these in relation to the causes by which they are produced, the phenomena which accompany them, or the effects to which they give rise. These varieties in the physiological consistence of similar tissues in different animals show likewise, that when they occur as pathological states, they are in all probability subjected to the influence of the same general laws as the former; that the limits which separate the two states, that is, of health and disease, can be defined only by a reference to a change of structure or function as regards the particular tissue, system, or organ, in which it occurs, the age, sex, or kind of animal in which it is observed. Hence, in our examination of this, as well as of every other modification which takes place in the internal and external conformation and composition of organs, the necessity of taking as the point of comparison that state of each which is found to prevail at any particular period of life, and which constitutes the type of the condition whose changes we wish to describe.

II. *Pathological modifications of consistence.*—We have already observed that the opposite changes of consistence of organs are named softening and induration. The latter only will be examined in the present article.

A greater or less increase in the consistence of organs, particularly of the softer ones, has always attracted the attention of the pathologist, and whether existing alone or in connexion with other changes, has sometimes enabled him to determine the particular nature of a disease, more frequently to detect diseases at their commencement, even when no alteration of the bulk, form, colour, sensibility, or temperature of the part, was perceptible. Hence the importance which has long been attached to this physical alteration, but which, as regards its diagnostic value, may be fairly considered as having seldom served any higher purpose than a signal of alarm of present or of future danger. It is only within these few years that induration and inferior degrees of this state have been more successfully studied, and the knowledge thus obtained more usefully applied as a means of diagnosis. Several diseases, indeed, which were believed to consist simply in an augmentation of cohesion, in an increase of density of the solid materials of a tissue, are now known to depend on very different states; that a morbid increase of consistence is much more frequently dependent on the presence of an accidental or new product, fluid or solid, external to or combined with the tissue which is so altered, and consequently, that it is in these cases merely an effect, and no index whatever of the nature of the disease on which it depends. Mechanical, microscopical, and chemical analysis have shown that this physical condition varies much in its nature in the same or different tissues; and observation and experiment have also shown that it is produced by causes of a very op-

posite kind, and that the modifications of function by which it is accompanied are no less diversified. Since, therefore, induration is, in general, to be regarded as a symptom of previous or co-existing diseased states, it would appear to us to be of great and essential importance to determine, before proceeding farther, what the diseased states are on which induration depends.

Every degree and form of induration may be referred to changes which take place in the conformation and composition of organs.*

1. *Induration depending on changes which take place in the conformation of organs.*—The only change comprehended under this head, which gives rise to induration, is that of bulk.

Under change of bulk we include hypertrophy and atrophy, and changes in the quantity of the fluids of nutrition and secretion, as conditions which are not unfrequently accompanied with an increase of consistence of the otherwise natural and healthy texture of organs. Hypertrophy, however, is the only state in which increase of consistence can be regarded as a simple disease, inasmuch as it does not depend on the presence of a foreign product; the increased consistence in such a case being a consequence of a superabundant, molecular deposit of nutritive matter of a homogeneous kind in a tissue; and arranged in the normal order. But, that an increase of consistence depending on these circumstances should follow, it is not necessary that it should be accompanied by any change of bulk of the organ in which it is observed; for there may be hypertrophy without change of bulk, from the mode in which the additional deposit takes place.

The most remarkable examples of morbid increase of consistence depending on an augmentation in the quantity of healthy, solid material which enters into the composition of organs, are met with in those which are naturally soft; as in the medullary and cortical substance of the brain and spinal marrow; in the lymphatic and salivary glands, and in the cellular and muscular tissues, and even in those tissues which are naturally firm and hard, as the fibrous and osseous, in which the induration is sometimes extreme. The brain has not unfrequently been found increased to twice and even thrice its natural consistence; that of glandular, cellular, fibrous, and muscular tissues, become so hard, that they occasion a particular grating sound when cut; and the walls of some hollow organs, naturally soft and flaccid, acquire such a degree of firmness, that they preserve, when empty, a globular or cylindrical form, and spring up with considerable force after sudden pressure; and parts of bones acquire that degree of hardness which has been called eburneoid or ivory-like induration.

Induration, as a consequence of a diminu-

* We employ this arrangement here, having adopted it as the basis of our classification of all organic diseases.

tion in the quantity of the healthy solid material of an organ, is, perhaps, never observed, unless it is accompanied by other morbid states. It is only observed in soft, spongy, hollow organs, from which the fluids of nutrition have been removed, and for this reason we shall give examples of it under the following head.

Changes in the quantity of the fluids of nutrition frequently give rise to induration analogous to that which we have just now generally noticed, the one depending on an augmentation of the healthy solid, the other of the healthy fluid materials of an organ. The accumulation of blood in the vessels of the lungs, in the spleen, and tumours of a similar structure in various forms of congestion, produces sometimes a great degree of tension, hardness, and density of these organs.

Great diminution in the quantity of the same fluid is also followed by an increase of consistence of organs. Like the former, it is chiefly observed in the lungs and spleen, which feel as hard as liver or even cartilage. It is, however, to be observed that the increase of consistence in this case does not follow as an immediate consequence of the removal of the fluids of nutrition of these organs, but depends on the subsequent collapse and approximation of the walls of their vascular and cellular textures. In order, therefore, that induration of this kind should be great or permanent, it is necessary that there should be, besides the primitive cause, (*viz.*, the removal of the fluids,) an external or compressing force. Hence it is that induration of the lungs, of this kind, is met with most frequently in pleurisy; the lung may simply be compressed by the effused fluid, as in the acute form of this disease, or it may in addition be permanently enclosed in a dense fibrous membrane of new formation, as in chronic pleurisy. When a lung in this state is examined, it is found to be indurated merely from the approximation of its solid textures, and may be made to assume by inflation its natural bulk and consistence when the accidental fibrous envelope has been removed from its external surface. The constricting force of such pseudo-membranes is, perhaps, no where so marked and so peculiar in its effects as when it covers a portion only of a lung or of a single lobe. When a whole lung is contracted, reduced to the bulk of the fist, pushed into the hollow summit of the chest, or flattened and fixed along the spine by a dense fibrous covering, the effused fluid is generally believed to be the sole cause of the diminution of bulk of the organ and of its subsequent condensation. Such, however, is not the fact. It is also owing to that very remarkable property possessed by accidental fibrous membranes, by means of which they contract during the last period of their organization, and thereby gradually compress, diminish in bulk or capacity, or entirely obliterate hollow organs. It is, as we have already observed, when pleurisy has been circumscribed, limited to a single lobe or a portion only of one, that the effects of the

contractile property of the fibrous membrane are most strikingly illustrated. The portion of lung included in this membrane feels quite solid, hangs pendulous, or projects outwards in the form of a small tongue or dog's ear; or it may have a conical or cylindrical form of various dimensions. The portion of lung so compressed and indurated is immediately recognized not only from its diminution of bulk and peculiarity of form, but by the pale, uniform, white colour of its accidental fibrous covering, instead of the mottled aspect of the lung under the transparent pleura; and the cause of its density is farther demonstrated from the absence of every external compressing cause, fluid or solid (for it is not necessary that effusion should be present in such cases), except the fibrous membrane, and from its bulk and consistence being restored in the manner already noticed.

Condensation and induration of the spleen is often effected in the same way, that is, from the constricting force of an accidental fibrous membrane.

The last form of induration which we shall mention here, produced by the fluid contents of organs, is that which is found to accompany an augmentation in quantity of the healthy fluids of secretion: as of the milk in the breasts, semen in the testes, bile and urine in their respective reservoirs. The inordinate accumulation of any of these secretions in their proper vessels gives rise to a degree of hardness sometimes equal to that of hard tumours,—a circumstance arising from the incompressibility of the fluids themselves, and the state of condensation of the walls of the organs in which they are accumulated.

2. *Induration depending on changes which take place in the composition of organs.*—The increase of consistence included under this head may be referred to the presence of accidental or new products. These may be either fluid or solid. Of the first kind we have the natural fluids of nutrition and secretion, and some anomalous fluid products; of the second, we have all the solid accidental and new products which are found in the different textures and organs of the body. By far the greater number of these products require only to be named in this place, inasmuch as the induration which they produce depends on the degree of consistence which they themselves possess, and not on any change induced in the texture of the organ in which they are formed. There are, however, others, some of the natural fluids, and various anomalous fluid products, which, when effused into natural or accidental cavities, occasion from their accumulation, or the rapidity with which they are effused, great increase of consistence of the containing solids. When blood, or serosity containing various proportions of albumen and fibrine, is effused into the cellular tissue or the cavities of organs, the distention which these fluids occasion is sometimes so great as to render parts naturally soft and flaccid, quite dense, and almost unyielding. Thus the parenchyma of organs and the cellular tissue in general, when they be-

come the seat of hemorrhage, as pulmonary apoplexy, ecchymosis, &c. feel sometimes quite hard; and such is the state of the walls of the abdomen from the great accumulation of serosity in ascites, and of the cellular tissue of the extremities in œdema. The effusion of serosity into the intermuscular cellular tissue produces sometimes an extreme degree of induration, even when the muscular organ is not submitted to the influence of any external compressing cause. This is particularly observed in œdema of the tongue, in which this organ becomes as hard as a piece of wood. The same state is met with in the heart, although in a much less degree; also in the brain, liver, salivary and lymphatic glands. What is called hepatization of the lungs is a modification of consistence of a similar kind, but is produced by the presence of coagulable lymph, pus, and blood, as well as serosity.

To complete the general view of the diseases from which induration may arise, we have only to add that the accumulation of gases in the cavity of the abdomen and digestive organs sometimes occasions an extreme degree of tension and hardness of the abdominal parietes, and that collections of pus, atheromatous, melicerous, and other adventitious products, constitute swellings which communicate to the surrounding parts various degrees of induration. We may also note in this place, as a cause of induration, the accumulation of the contents of the stomach and intestines so frequently produced in these organs, particularly from stricture. Thus fecal matter may be accumulated in the cæcum, and communicate to the hand the sensation of a hard tumour in that region; or the whole of the colon may be similarly distended from stricture of the rectum, and be seen as well as felt throughout its whole course of an enormous size and extremely hard; and the stomach may be so distended in stricture or obstruction of the pylorus as to occupy the greater part of the cavity of the abdomen in the form of a globular swelling, offering considerable resistance to pressure.

Although the state of induration which we have been considering has always been confined by pathologists to changes directly or indirectly induced in the solids, whereby their consistence is increased, we do not see any reason why the same alteration, when considered in a general point of view, and as implying merely a modification of consistence, should not embrace changes of a similar kind which take place in the fluids of nutrition and secretion. The various degrees of fluidity which these products are found to possess, appear, in fact, to present us with some of the most simple forms under which the various degrees of consistence of matter can be subjected to our senses, at least in so far as regards the materials of organic composition. Various degrees of fluidity of the blood are observed, from a watery thinness to a state of inspissation approaching to coagulation, which last is, perhaps, a manifestation in an extreme degree of one and the same property. It is, indeed,

highly probable that the consistence of the blood depends principally on the fibrine which it contains, and may vary in degree with the quantity and quality of this important constituent,—an opinion, the truth of which appears to be proved by the fact that coagulation of the blood is no other than spontaneous solidification of the fibrine. The opposite state, or extreme fluidity produced by frequent hemorrhage or bloodletting, reduces this fluid to the consistence of serosity, chiefly by the removal of the greater part of its fibrine, —a further evidence of the influence which fibrine exercises on the consistence of the blood.

The consistence of the blood is always increased in a greater or less degree by whatever reduces the velocity of the circulation below that of the healthy state. The blood that first flows from a vein in phlebotomy is not only darker but thicker than that which escapes some time after, on account of its having been brought to a state of rest by the constricting force of the bandage; and as the buffy coat is generally increased under similar circumstances, it would appear that the fibrine had already assumed a disposition to coagulation; for cessation in the motion of the blood, even when very limited in duration, is always accompanied by a tendency to separation in its constituent parts and to coagulation of the fibrine. Hence it follows that ligature, tumours, and other mechanical obstacles situated in various parts of the body, and certain adynamic states, as local and general debility, which retard or arrest the motion of the blood, occasion, in the manner just stated, inspissation and coagulation of this fluid,—effects which often lead to other diseased states that sometimes terminate in death.

It may not be out of place to remark here, inasmuch as it is not our intention to discuss afterwards the changes which take place in the fluids of nutrition and secretion in the different organs of the body, that the study of this physical property, whether existing as a primary or secondary diseased state, seems to us to be one of considerable interest, and, as well as many other still more important changes of these fluids, deserves to be carefully prosecuted, and promises to those whose knowledge of animal chemistry enables them to do so, results of the highest importance. There was, indeed, a time in the history of humoral pathology when some of the physical qualities, and in particular the consistence of the blood and other fluids of the body, attracted almost exclusively the attention of the physician. But, whilst an acquaintance with the laws of fluids in motion enabled him to explain some of the changes which he observed to take place in the circulation of the blood, it was at the same time the great source of the many errors which were introduced into the humoral pathology at the period to which we allude. Nevertheless, not a few of the morbid states of consistence of the circulating and secreted fluids were known to the humoral pathologist, and suggested to him the use of various remedies for their cure.

The doctrines of solidism, as exclusive as those of its now too much neglected predecessor, led away the mind of the physician from the study of the diseased states of the fluids, or induced him to ascribe the origin of those which he occasionally recognized to some previously existing disease of the solids, of which they were supposed to be merely effects, and to be removed by the cure of the primary disease. Such opinions contain much that is untrue as regards the origin of diseased fluids, and even when effects of disease of the solids, it by no means follows as a consequence that the cure of the one will necessarily be followed by the cure of the other. Facts are not wanting to prove the contrary, and to shew the necessity of directing the operation of remedies in such a manner as to effect a salutary change in the pathological conditions of the fluids. But as regards the subject of our immediate consideration—the increased consistence of the fluids of nutrition and secretion—we find not unfrequently examples of this change in the blood of certain individuals labouring under plethora from various causes, and also in many cases of great local congestion, as we have already observed.

Inspissation of the bile is a common occurrence, particularly in the gall-bladder; and here, as in the bloodvessels, the transit of the respective fluids must be more or less impeded by such a change. The formation of gall-stones appears in some instances to depend chiefly on this condition of the bile, which, being thus prevented from passing along the ductus communis choledochus, undergoes the chemical changes necessary for the formation of these accidental products.

Alarming and even fatal consequences arise from inspissation of the mucous secretion of the bronchi, larynx, and even posterior fauces, particularly in individuals debilitated by disease. In such cases the mucous secretion may be perfectly healthy, but having its fluid portion absorbed, it becomes thick and viscid, adheres to the mucous membrane, and accumulates to such a degree as to obstruct the passage of the air, and thus sometimes produces fatal asphyxia. We have ourselves seen the life of more than one individual saved by the removal of this viscid secretion from the posterior fauces and larynx, by mechanical means and change of position. The copious use of cold water given with a view to diminish the plastic property of the blood, is said to have prevented the deposition and formation of the false membrane in croup, or to facilitate greatly its subsequent removal. Are the beneficial effects obtained from the use of mercury in this disease to be attributed to a similar mode of operation?

From these general observations on the diseased states on which induration depends, we may now refer this increase of consistence of the fluids and solids of the body to the following heads:—

1. To a superabundant molecular deposit of solid nutritive matter of the same kind as

that which enters into the healthy composition of a tissue—hypertrophy.

2. To an increase in the quantity of the fluids of nutrition and secretion—various forms of congestion, retention, &c.

3. To a diminution in the quantity of the fluids of nutrition—diminution of bulk from compression.

4. To the presence of solid, fluid, and gaseous, accidental and new products—scirrhus, cancer, &c., hemorrhage, dropsy, œdema, tympanitis, &c.

5. To changes which take place in the qualities or elementary composition of the fluids of nutrition and secretion—thickness, inspissation, coagulation.

It is hardly necessary to observe that several of these diseased states may exist at the same time, and by their combination give rise to compound forms of induration of one or several tissues of the same organ. The characters of each kind are, in this manner, much obscured, and can only be determined by a careful examination of the part, so as to discover the particular diseased state on which each kind depends.

Independently of this source of obscurity, the characters of induration are frequently rendered still more obscure from the changes of bulk, form, and colour with which it is accompanied. The principal changes of bulk which accompany induration are already known to the reader. It is only necessary to remind him that induration may exist without any change in the dimensions of an organ, and that an increase is infinitely more frequently observed than a diminution of bulk.

The changes of form with which induration may be connected are extremely numerous; but as they are of no great importance in the present inquiry, we shall only observe that induration is not necessarily accompanied by any modification of this state.

Various kinds of colour are, perhaps, still more frequently found to accompany the induration of tissues, and modify the appearance which they present in a much more remarkable manner than changes of form or bulk. In the second, third, and fourth kinds of induration which we have enumerated, the sources of the greater number of the changes of colour which accompany these states are obvious. But there are others which are derived from the colouring matter of the blood deposited in tissues, or afterwards modified by the operation of external agents. Hence, the colour of an indurated tissue may be quite healthy, diminished, or increased in intensity, or it may be entirely different in kind; examples of which are met with in hypertrophy, atrophy, congestion, hemorrhage, jaundice, and melanosis.

Changes in the weight, humidity, transparency, and sonorousness of organs, are not only complications, but frequently the immediate effects of induration. Those of weight, humidity, and sonorousness, are all strikingly exemplified in pneumonia terminating in hepatisation; and those of transparency are not rare in membranous tissues.

Having pointed out these sources of complication, we should now proceed to describe the distinctive characters of each kind of induration; but having already entered sufficiently into this part of our subject, which we regard as embracing only the generalities of a morbid state, the physical, anatomical, and chemical characters of which belong to or are derived from other diseases, we have to refer the reader to these diseases, which we have named, for further information on this head. There are, however, certain modifications of function produced solely by the state of induration, and which may be regarded as constituting the physiological characters of this state. These are, modifications of sensation and motion. Thus pain, sometimes of the most acute kind, is produced by the hard unyielding nature of certain tumours compressing or constricting the nerves of sensation distributed to, or which pass in the vicinity of, the diseased organ. Similar effects on the nerves of motion give rise to paralysis. Motion of the solids is, besides, mechanically impeded by induration, which prevents the change of situation and bulk which ought to follow muscular contraction or that of elasticity; and the motion of the blood, bile, urine, and other fluids, may be greatly impeded, or even entirely arrested by the hard unyielding nature of accidental products. Having already pointed out the greater number of these facts which are of any degree of importance, we shall conclude the general part of our subject with a few remarks on the symptoms, causes, and treatment of induration, considered as a morbid affection in the living body.

Symptoms.—The symptoms of induration, considered in a general point of view, are not to be separated from those of the diseases on which it depends; and although the modifications of sensation and motion which we have just noticed are the immediate consequences of this physical change, they do not furnish us with any positive sign of its existence, unless it be at the same time felt or otherwise perceived. Induration, therefore, is not to be detected during life, except in cases in which it is perceived by the touch, or the *mediate sense* of auscultation and percussion,—means which, together with the modifications of sensation and motion mentioned, and those of bulk, form, and colour, to which we have also alluded, will enable us, when properly employed and appreciated, to detect in certain organs the kind, situation, degree, and extent of this morbid state.

Causes.—The causes of induration are also, properly speaking, those of the diseased states on which it depends, and, therefore, anything we might say on this head would be foreign to the present enquiry. Much, however, has been said on the causes of induration, when employed as synonymous with the term scirrhus; but as we regard this state as something more than induration, or induration and hypertrophy united, we think it more consistent with the order which we have hitherto followed, to leave the etiology of scirrhus to be investigated in its proper place.

Treatment.—The principal part of the treatment of induration to which we have to direct the attention of the reader in this place, is that suggested by the modifications induced in the functions of sensation and motion as immediate effects of this physical condition.

When pain arises from induration, and the consequences which frequently follow this change, as weight and tension, it is seldom removed or even much mitigated when seated in internal organs, unless the exciting cause be a fluid. In this case the removal of blood is found to be sometimes followed by great diminution or even the entire cessation of the uneasiness, anxiety, or suffering, which its presence had occasioned; as in great congestion, for example, of the brain and lungs. The good effects of venesection in most cases of plethora are also in part to be attributed to the removal of a quantity of the same incompressible fluid, whereby the organs of circulation, respiration, and innervation are allowed more free and extensive action. The pain which always accompanies the vascular tension of an inflamed part, and more particularly that occasioned by the effusion of serum and pus in the cellular tissue, and beneath unyielding fibrous coverings, is still more remarkably relieved by the destruction of the constricting causes and the evacuation of the incompressible fluids. The relief which patients experience on the removal of the fluids collected in the cavity of the pleura and abdomen in acute inflammation of their respective serous coverings, in some forms of ascites and oedema, in retention of the milk, urine, &c. is to be attributed in no small degree to the judicious application of the same principle.

When pain is occasioned by the pressure of a hard tumour, it may be mitigated or removed by the following means—change of position, warm fomentations, anodynes, extirpation, and other mechanical means. Change of position seldom accomplishes much in the way of removing pain, and has only been found to be occasionally suggested by patients themselves who have accidentally discovered that their sufferings were relieved when in certain positions; as in some cases of pendulous tumours contained in cavities.

Warm emollient applications, from the relaxing effect which they produce on the parts to which they are applied, are often of the greatest benefit. Independent of the benefit which for a time may be derived from the general administration of anodynes, more decided and more permanent advantage has of late been obtained from their local application, in the manner recommended by some French physicians, and called by them *la méthode endermique*.^{*} This method, so far as we know, has not been employed to remove pain produced by the pressure of hard accidental products or tumours; but from its successful application in several cases of acute and

^{*} *Essai sur la Méthode Endermique*, par Ant. Lambert, Paris.—*Trousseau*, Journ. Univer. et Hebdom. de Méd. et de Chir. Pratique, tom. iv. p. 82.

chronic neuralgia in external parts of the body, we feel strongly disposed to believe that the continued and sometimes excruciating pain which accompanies certain subcutaneous and even deeper-seated tumours of the nerves, would be greatly relieved or entirely removed by the application of the salts of morphia or belladonna (the remedies hitherto employed) to the denuded skin in the tract of the affected nerve. The cure of these cases and others of a similar kind belongs, however, to the province of surgery, and consequently we can only name the third mode, viz. extirpation, excision, and other mechanical means employed in that department of medicine.

With regard to the means to be employed with a view to facilitate the motion of solids and fluids, impeded by an abnormal increase of consistence, we have little to add to what we have already suggested on this head. The physician when compared with the surgeon is wonderfully limited in the means which he has to employ in many of these cases. Those remedies alone which exercise a special influence on the great function of nutrition in general, or on those of hematosis, circulation, absorption, and secretion in particular, seem sometimes to afford a well-grounded hope that many of the diseased conditions which give rise to induration are not altogether beyond the salutary influence of medicine.

SPECIAL PATHOLOGY OF INDURATION.

Having entered rather fully into the general pathology of induration, we do not think it necessary to discuss the special pathology of this disease, unless in the two following cases—induration of the cerebral substance, and induration of the cellular tissue.

I. Induration of the cerebral substance.—Perhaps no term has been more vaguely employed by physicians to designate a particular diseased state of the brain than that of induration. There are, in fact, few accidental products which, at one period or other of their development, and formed in the substance or on the surface of the brain, have not been described as induration of this organ. Much of this ambiguity has, however, been removed by a more accurate knowledge of the anatomical characters of these diseases; and however obscure or uncertain may be the origin, nature, symptoms and treatment of many of them, their being thus brought before us under a distinct and tangible form has already been productive of much good. It is, perhaps, owing to this circumstance alone that so much progress has of late years been made in the pathology of the brain.

The substance of the brain is, as we have already said, subject to an increase of consistence independent of the presence of any foreign product deposited within or upon it. It is only under such circumstances that we admit the existence of induration as a disease. Hence, it is only in certain forms of hypertrophy and atrophy that we find a simple increase of the consistence of this organ. It is, however, by no means easy in every case to determine that an increase of consistence depends alone

on a modification of one or other of these conditions of nutrition; for colourless effusions, containing a greater or less quantity of albumen and fibrine, may take place in the fibrous texture of the brain, and produce various degrees of consolidation of the cerebral substance. But when such effusions are not to be detected; when there is no other morbid product present; when the brain or a portion of it is harder than we know it should be at the period at which it is submitted to our examination, we are then to consider it to be in a state of simple induration, whether its colour be altered or not. The degree and extent of such a condition of the cerebral substance may present very considerable variation. Sometimes the increase of consistence is so slight that we only admit its existence as probable; at other times it is so great as to be perceived even before it is touched, on account of the softer surrounding substance falling down when divided, and leaving the indurated portion more elevated. If, in the first case, the augmentation of consistence be circumscribed instead of being general, we have then in almost every case the means of determining how far it is a pathological state, by comparing the part supposed to be diseased with the corresponding healthy part,—a mode of examination which ought always to be had recourse to under similar circumstances in every organ of the body whenever it can be employed. We of course suppose that a previous knowledge has been acquired of the several degrees of the healthy consistence of the brain in general, and of its parts in particular.

The several degrees of morbid increase of consistence of the cerebral substance may be represented to the mind of the reader by the changes of consistence which the brain itself undergoes after it has been submitted to the action of alcohol, acids, or boiling oil, for a given length of time. It then cuts like the white of a hard-boiled egg, the udder of the cow when boiled, or firm smooth cheese, such as that of Gruyère. It has been represented to be sometimes as hard as fibrous or cartilaginous tissues; but such degrees of induration of the brain do not, we believe, exist as simple states, and depend on the presence of accidental tissues.

The greater the degree of induration, the greater the change of colour the affected part undergoes: this consists in a diminution or entire want of the natural colour of that part. Hence, the natural colour of the medullary substance being pale, a diminution of colour is principally observed in induration of the brown or cortical substance, which may become so pale as not to be distinguished from the medullary with which it is in contact.

The first as well as the succeeding degrees of induration may present this state of pallor, but it may likewise be redder than natural. In the former the substance of the brain, when cut, is sometimes moistened with serosity, at other times drier than natural; in the latter it presents a greater number than usual of red points or streaks of blood. A thin slice of

the indurated portion may be held out between the thumb and fore-finger, and, when pressed, sometimes snaps through like a bit of boiled albumen. It is only when this diseased state is circumscribed that it has been observed to be great in degree; and when it occupies the whole brain, it generally amounts to little more than what may be called a state of firmness.

An increase of bulk in induration of the cerebral substance is not easily ascertained unless the affected part be in the convolutions, in some of the circumscribed and distinct portions of it, or occupies the whole brain. A diminution of bulk accompanying the same state presents the same difficulties. Both, however, have been observed; but the former much more frequently than the latter.

The brain is far more frequently the seat of induration than the cerebellum; the cortical substance perhaps more so than the medullary; the peripheric portion of the latter than the central; the basis than the surface of the hemispheres.

The medulla spinalis, in which this change has also been observed in a circumscribed or general form, is much less frequently affected than the brain, and has seldom been seen to acquire the same degree of morbid consistence, except at its upper portion, and more particularly the medulla oblongata.

Symptoms of induration of the brain.—Of the various authors who have observed and described induration of the brain and spinal marrow, some of them have regarded it, when general, as giving rise to ataxic or typhoid fever, and some forms of mental derangement, being in the former an acute, in the latter a chronic state of disease. Others have endeavoured to shew that tetanus, epilepsy, and other nervous and convulsive disorders, may also sometimes originate in the circumscribed form of the same pathological state. Whilst we add our testimony to the truth of the anatomical part of the facts on which these opinions have been founded, we must at the same time say that we feel but little disposed to place much reliance on the diagnostic value of the symptomatic details which these authors have collected on this subject. In the present state of our knowledge we believe that we possess no means of detecting the existence of induration of the brain and spinal marrow during life, the symptoms which have been found to accompany it—such as various modifications of sensation, motion, and intelligence—being common to many very different morbid states of the same parts. The derangements of function which follow as the immediate consequences of induration of the cerebral substance are, indeed, sufficiently obvious to the physician; but, for the reasons just stated, they afford him little or no assistance in determining the nature of the lesion on which they depend.

Causes.—The etiology of this morbid state is by no means so well understood as some pathologists would have us believe. That certain forms of it depend on a previous state of irritation every one must admit; but that

this state of irritation, or any modification of it, is the sole cause of induration, is by no means in accordance with the results of observation. In that firmness of the brain in general, observed in some forms of fever accompanied with more than ordinary excitement, and in some cases of acute hydrocephalus, in some kinds of mania accompanied or not with paralysis, irritation of the brain or its membranes may be regarded as at least the probable cause. Circumscribed induration of the cerebral substance may also originate in the same cause, inasmuch as we find it present and in juxta-position with other diseased states, such as ulceration and abscess, having a similar origin. But for reasons equally cogent, we are led to reject the evidence on which it has been attempted to establish the general application of this principle to the etiology of this disease. When, as we have stated in the introductory part of this article, we find that portions of organs, and even whole organs, acquire a great increase of consistence without presenting any, even the slightest, modification of function such as is observed to accompany irritation; that the same organ (the brain too) is soft at one period of life and firm at another; that an organ that is soft in one animal is hard in another; we cannot resist the conclusion that increase of consistence,—that is, induration,—when occurring out of the usual order of place and time, may nevertheless be something else than a consequence of any morbid state with which we are yet acquainted, however much we may pretend to be familiar with its ways of working. It would seem to us to be much more consistent with a sound philosophy to attribute the production at least of some of the forms of induration of organs to the influence of other and still more general laws than those of irritation, viz. those of organization; and, moreover, that instead of occupying the rank of a cause, irritation in this as well as in numerous other instances, follows as an effect, and thence becomes a valuable evidence of the existence of the former.

Treatment.—As the causes of induration are obscure, and more particularly as we are unable to recognise the existence of this state during life, we have of course no indications or modes of cure to propose. We except, however, from this barren and unsatisfactory result that form of induration which we have stated may arise from an augmentation in the quantity of blood usually admitted into an organ. Such is the state of the brain in congestion, the treatment of which is given in another place. It may not be unimportant to remark that the principal phenomena of congestion, loss of sensation and motion, seem to be the immediate effect of the state of induration induced in the cerebral substance by the accumulated blood: the degree of density alone, which is thereby induced, being sufficient to unfit the organ for the accomplishment of its functions, independent of the other changes which we well know follow as a consequence of such congestion.

II. *Induration of the cellular tissue.*—*Syn.*

Induratio telæ cellulosa; sclerema; squirrhosarque; œdème concrète; œdème du tissu cellulaire des nouveaux nés; zellgewebsverhärtung; skin-bound disease.

The cellular tissue affords so many facilities for the formation and development of disease, that it has been regarded by several pathologists as the primary seat of almost all morbid products. Various circumstances, the exposition of which does not come within the scope of this article, concur to give rise to such a belief, but which is as little founded in fact as every other exclusive theory regarding the common origin of diseases. The pathological state which we have to examine furnishes a striking example of the fallacy of such generalising principles, induration of the cellular tissue being, in point of fact, one of its most equivocal characters.

Induration of the cellular tissue constitutes a case of complicated induration, depending exclusively, as regards the local affection, on an accumulation of serosity or sero-albuminous fluid in the cellular tissue. It is therefore only in accordance with custom that we have introduced this state under the appellation of induration of the cellular tissue. We shall, however, employ the term *œdema* (instead of induration) of the cellular tissue, as it fully and accurately expresses the condition on which the induration depends, to which we may add *of new-born children*, to distinguish it from that which occurs at an after period of life. Although this affection is generally observed in children a few hours after birth, it may occur several days later; and there are examples of children having been affected with it when born.

The subjects of this disease are for the most part feeble; sometimes imperfectly developed, and generally born before the full period. They do not seek the breast, but refuse to suck; they are agitated almost continually, and have a peculiar cry. The skin is dry, cold, as if stretched; generally of the natural red colour, but sometimes purple or livid. The soft parts feel firm, or even hard; when pressed they become pitted, and of a dull yellow colour; but the primitive form and colour soon return, unless the œdema be extreme. These appearances are generally observed to begin in the inferior extremities, passing from the feet upwards, and sometimes proceed with great rapidity, attacking the hands and arms; the inferior part of the abdomen, back, and face. Sometimes it appears to affect almost all these parts simultaneously, and nearly to the same degree. More rarely it is confined to the feet and hands. The bulk of the affected parts is increased, particularly that of the inferior extremities, but by no means in proportion to the degree of induration which they communicate to the hand when pressed. The diminution of temperature of the affected parts follows in a descending ratio the progress of the œdema, and in some cases has been observed to precede it. The production of heat is rapidly diminished over the whole body; the inferior extremities become quite hard and

stiff; the superior extremities and trunk less frequently to the same degree. In extreme cases the application of heat to the body only acts upon it as on dead matter, its temperature being suddenly raised or cooled as the warming medium is applied to or removed from it.

The other signs of functional derangement which accompany this affection increase in severity with the same rapidity. The respiration, at first imperfect, becomes difficult and laborious, and the pulse so feeble as sometimes not to be felt. In this state death supervenes from asphyxia, generally within the fourth day, sometimes on the first, and more rarely at the end of one, two, or even three weeks.

These are the most prominent and remarkable symptoms; those which may be regarded as proper to the disease. The symptoms of jaundice, although frequently present, are, however, perfectly distinct from those of this form of œdema. The same may be said of those of cerebral, gastric, intestinal, and acute pulmonary affections, which have been regarded by some as giving rise to the affection.

The characters of this disease are so well marked that it cannot be confounded, unless when circumscribed, with any other disease by the most careless observer; and even in this form it is only necessary to note the diminution of temperature which accompanies the œdematous swelling, to distinguish it from any inflammatory affection of the skin which gives rise to a similar state of the cellular tissue, and in which the temperature of the affected part is always morbidly increased.

It is rare that the physician has the satisfaction of being able to pronounce a favourable prognosis in this affection after it has arrived at a certain stage. It is only when the œdema is limited in extent and not great in degree; when the circulation and respiration are not much affected; when the temperature has not sunk much below the natural standard, and when the strength of the infant can be supported by its taking the breast, that a favourable termination may be reasonably expected. In such cases, as well as in those of a severer kind which recover, the signs of a favourable issue are to be drawn from the amelioration which takes place in the state of the respiratory function, which becomes less embarrassed; the increasing strength of the pulse; the gradual elevation of the temperature of the skin; the diminution of the swelling, and particularly of the induration; the disappearance of the deep red or livid colour which it may have presented, and the supervention of a gentle moisture over its hitherto dry surface—the child becomes quiet, sleeps, and manifests a desire for food.

Before proceeding to examine into the causes of œdema of the cellular tissue of new-born children, we shall, in the first place, endeavour to give a correct statement of the facts which the morbid anatomy of this disease has enabled us to collect.

The external aspect of the body is but little changed after death. The affected parts still preserve the same colour; the face and upper part of the trunk are even more swollen, and

the induration in general is rather increased than otherwise; the softer parts, such as the face, evidently so.

When a section of an œdematous extremity, the leg for example, is made so as to expose fully the subjacent cellular tissue, instead of finding this tissue compact and indurated, we find on the contrary its cellular aspect much increased, from the cells being filled with a serous or sero-albuminous fluid, which is either quite limpid, of a citrine colour, or tinged with blood. The quantity of this fluid is in proportion to the degree of swelling and induration which accompanies it. If small in quantity, the cellular tissue requires to be pressed before its presence can be recognised; but when abundant, it distends the cells of the subcutaneous cellular tissue, and a part of it oozes or flows out from the compression which the divided skin exercises upon it, or by its own specific gravity. When the whole of this fluid is forced out by pressure from the subcutaneous cellular tissue, it then feels soft and extensible; and the skin, which was before stretched and fixed, becomes lax, and can be moved over it as in the healthy state. When examined narrowly, it is found to present no thickening, opacity, or change of consistence. Its colour may be natural, or reddened by a slight degree of vascularity. The intermuscular cellular tissue may present the same appearances, but in a much less degree.

When the serous effusion occupies the adipose as well as the cellular tissue, the feeling of hardness is increased. The granules of fat, so conspicuous and firm in the child, are in this way compressed between two forces. They appear whiter than usual, resemble the fat of meat, and are hard, as if frozen. This state of the adipose tissue does not necessarily accompany œdema of the cellular tissue, as it occurs frequently without it.

From these facts, the truth of which we have had ample opportunities of verifying in a large hospital set apart for the reception of new-born children—the *Enfants Trouvés* at Paris, it must appear obvious that the state of induration observed in these children is a purely mechanical effect, depending on the accumulation of a fluid in the subcutaneous cellular tissue. The term induration never could have been employed to designate such a morbid state, had those who first observed and described it submitted the affected parts to careful anatomical investigation. Denman, Underwood, and others since their time, have stated that the cellular tissue, in the cases which they observed, was not only hard but *dry*. As we have never met with one example of such a nature among the great many cases which we have examined, and as we know that the disease which they described is the same as that of which we are now treating, we feel disposed to doubt the reality of such cases. It would serve no good purpose to multiply facts to prove that those pathologists have been also deceived who have described the cellular tissue in this disease as thickened and hardened; particularly Allard, who considered it in this

respect as analogous to the elephantiasis Arabum, or what is commonly called Barbadoes leg. (See ELEPHANTIASIS.)

The presence of a greater or less quantity of serosity or sero-albuminous fluid in the subcutaneous cellular tissue constitutes the essential anatomical character of the disease we are describing; and in this respect it is to be regarded as œdema, differing perhaps little even in its nature from that which is much more commonly observed in adults, as a consequence of disease of the organs of circulation and respiration, and in whom it also presents to the touch the sensation of various degrees of induration.

Not satisfied with this simple explanation of induration of the cellular tissue of new-born children, some pathologists would have the effused fluid possess the property of becoming concrete, and to this circumstance they attribute the degree of hardness which the affected part communicates when pressed. For this reason also, they regard it as different in its nature from the œdema of adults, and have on that account, and to distinguish it from the latter, called it *concrete œdema*. The results of some experiments made by Chevreul on the effused fluid taken by Breschet from the cellular tissue of children affected with œdema and jaundice at the same time, (a very frequent complication,) appeared to confirm the opinion that the induration depended on the coagulable nature of this fluid. Subsequent experiment, however, has shewn that the inference drawn from the fact of the coagulable property of the effused fluid was by no means correct; for not only is this fluid not found in a concrete state in the cellular tissue of new-born children affected with œdema, but the property which it possesses of coagulating spontaneously when placed in a state of rest, and exposed to the influence of the ordinary temperature of the air, exists also in the fluid found in the cellular tissue of adults affected with ordinary œdema. In all cases, in fact, of œdema produced by an obstacle to the return of the venous blood, does the effused fluid possess this property; and so far as our experience enables us to judge, the more sudden the production of the œdema, the greater the spontaneous coagulability of the effused fluid. Hence the reason why in the œdema of new-born children, in whom the effusion generally takes place rapidly, this coagulable property is more marked than in the chronic œdema of adults. Notwithstanding these facts, we must repeat that the state of induration is neither caused nor increased by this circumstance, for we have never found the fluid coagulated in œdema of the cellular tissue after death. That it is not coagulated during life we know, from the fact that it flows out when the skin is punctured.

Besides the state of the cellular tissue which we have described, various morbid appearances are observed in different parts of the bodies of those who die of infantile œdema. Some of these are always present, and are therefore to be regarded as essential to the production of

the disease; others are only occasionally met with, and on that account must be viewed in the light of coincidences.

The most remarkable among the constant lesions is a state of general venous congestion. The heart and great bloodvessels are filled or distended with blood; the lungs and liver, and indeed all the soft parts, are in a high state of congestion, particularly the former, which, when cut, discharge a great quantity of dark venous blood. There exists no mechanical obstacle in the heart, great bloodvessels, or lungs, to which this accumulation of blood can be attributed; and on that account it resembles plethora more than any other affection.

We need hardly observe that it is to this state of general congestion that the effusion of serosity in the cellular tissue is to be attributed, and that the same state of congestion, and the œdema which follows it in the lungs, are the causes of the difficulty of breathing which is present in this disease. The languid state of the circulation, and the stagnation of the blood in the capillary system in general, appear to us sufficient to account for the remarkable diminution of temperature which takes place in infantile œdema.

With this state of congestion there is, also, a greater or less degree of œdema of the cellular tissue of the viscera of the thorax and abdomen, and effusion of the same fluid into the serous cavities. The submucous cellular tissue in general is more or less œdematous; and it is this state of that of the glottis which occasions the cry peculiar to children affected with this kind of œdema.

These are the most remarkable of the constant lesions in infantile œdema. Those which occur accidentally, but which have been regarded by some pathologists as the causes of this kind of œdema, are numerous. The principal of them are acute affections of the lungs and liver, of the stomach and intestines, or of these and the subcutaneous cellular tissue at the same time; the non-occlusion of the foramen ovale; and a diminution in length of the intestinal tube.

Without denying that most of these morbid states, and some of them much more than others, contribute, when present, to increase the effusion into the cellular tissue, we are more disposed to believe that they are much more efficacious in retarding or rendering its cure impossible; and we are persuaded that they have no direct effect in producing it, since we have found it to exist in an extreme degree, when there was no other appreciable morbid condition to be detected but the general state of congestion which we have described.

After these remarks we trust it will not be considered an omission, if we overlook most of the theories, or rather hypotheses, which have been entertained regarding the etiology of œdema of the cellular tissue of new-born children.

Andry and Auvity, the first who gave a good description of this disease, attributed its production to the action of cold; but although it occurs more frequently in winter than at any other time of the year, it is often observed in

summer and under circumstances the most favourable as to external temperature.

The opinion of Breschet, that the effusion of serosity in the cellular tissue depends on the permanent opening of the foramen ovale, was soon shown to be unfounded. Indeed it is difficult to conceive how this intelligent pathologist could have offered such an opinion as the result of his observation. "In seventy-seven children," says Billard,* "affected with œdema of the cellular tissue, there was in forty of them complete occlusion of the foramen ovale, and in twenty-eight of these even the ductus arteriosus was considerably contracted, and did not allow the passage of the blood through it. The explanation of Mons. Breschet falls, therefore, before the evidence of facts. If the foramen ovale is still found frequently open in *hard children*, it is because induration of the cellular tissue affecting particularly very young children, the changes which take place in the heart and ductus arteriosus of the new-born child, after the establishment of the independent circulation, have not had time to be completed when the œdema appears. I think, therefore, that there is no relation between the two phenomena in question."

The last opinion which we shall notice is that of Mons. Denis, who has endeavoured to shew that an inflammatory condition of the cellular tissue which becomes affected with œdema, and of the mucous membrane of the stomach and intestines at the same time, are the causes of this disease. To characterize this complication, and no doubt anxious to do honour to the *Doctrines Physiologiques*, Mons. Denis has conferred upon it the appellation of *phlegmasie entéro-cellulaire*. Inflammatory affections of the gastro-intestinal mucous membrane are extremely common in infants, and must consequently be met with in those affected with œdema of the cellular tissue; and when we find œdema without them, and vice versa, we are not permitted to regard their simultaneous existence otherwise than as a coincidence. That the œdema of the cellular tissue is the consequence of inflammation, no pathologist who has examined it, and whose judgment is not biassed by preconceived notions, will believe. Were such the fact, we should find sometimes, if not always, some of the products or effects of inflammation of the cellular tissue, such as coagulable lymph or pus, or softening; which we ourselves (or, we believe, any body else, not excepting even Mons. Denis,) never once have met with.

Mons. Baron, who for a number of years has been physician to the *Enfans Trouvés*, regards the œdema of new-born children as analogous in every respect to that of adults.

An accurate observer and distinguished pathologist, Mons. Billard, who has had ample opportunity of studying this disease, considers its predisposing causes to be, 1st, a natural state of debility of the new-born infant; 2d, a

* *Traité des Maladies des Enfants Nouveaux-Nés*, &c. Paris, 1828.

state of general congenital plethora; 3d, a superabundance of venous blood in the tissues; 4th, a state of dryness of the skin before the exfoliation of the epidermis: and the direct causes, 1st, an obstacle to the course of the blood, resulting from the abundance of this fluid in the circulating system; 2d, its regurgitation in the cellular tissue, to which it furnishes an inordinate supply of the materials of secretion; and lastly, the action on the skin of external agents, which, without condensing, as has been said, the serous fluids, are capable of suspending the cutaneous transpiration, and thereby favour the accumulation of the serosity in the cellular tissue.

Treatment.—Reasoning on the evidence which we have endeavoured to lay before the reader on the nature and causes of infantile oedema, the curative indications which it suggests are but few in number. The state of general venous congestion that prevails; the diminution of temperature which accompanies this state; the dry atonic condition of the skin, and the state of debility of the little patient, constitute the chief points in the pathology of the disease to which the attention of the physician is to be directed. With a view to diminish the quantity of the blood, and thereby favour its circulation, leeches may be applied to the chest or oedematous parts; a practice which, although we have not seen it fairly tried, is said to have been remarkably successful in the hands of Palletta.

A more safe, and perhaps equally successful method of treatment employed to accomplish the same end, consists in the use of repeated friction with warm flannel, the body in the intervals being well covered with the same material, which is not to be allowed to become cool. The vapour-bath has been recommended; but it has not been found to answer the expectations of some physicians who had ample opportunities of giving it a fair trial. Mons. Baron has found friction and the application of warm flannel to the skin much more beneficial. The difficulty of breathing is sometimes greatly increased while the child is in the bath, and congestion and even sanguineous effusion have been known to take place in the lungs and brain soon after its administration.

If, under the judicious use of the means we have recommended, the pulse improves and becomes steadily more strong, the temperature soon rises, and the physician has the satisfaction to perceive that a gentle moisture breaks out over the surface of the skin. The oedema soon after begins to diminish, and with it the induration which it had occasioned; the motions of the child become more free, and the cry natural; the desire for food returns, and convalescence is complete, sometimes in a few days. Although we are not acquainted with any method of treatment so successful as that which we have recommended, it requires in many cases, either on account of their severity, the debility of the child, or the co-existence of other affections, much discrimination on the part of the physician, and a degree of care and patience not often to be found in

those in whose hands it may be said the lives of these little sufferers are placed, to regulate its application, and obtain from it its beneficial effects.

Acute affections of the lungs, stomach, and intestines, are, as we have said, extremely frequent at the same period, and when severe, destroy, perhaps, a greater number of children affected with them than the disease which we have described, and for which no mode of treatment can then be said to offer any reasonable hope of accomplishing a cure.

(R. Carswell.)

INFANTICIDE.—Before the end of the seventeenth century, medical men were not consulted in cases of infanticide. In the criminal code* of the Emperor Charles V. it was merely directed that the breasts and parts of generation should be inspected by an experienced and sensible woman, and the delivery being, as it was supposed, ascertained, the proof of the death of the child at birth was imposed on the mother. We are told also by Bohn† that a mother suspected of infanticide which could not be proved, was put to the rack to extort confession of her imputed guilt. In this country the statute of James I. was conceived in a similar spirit, for it concluded the mother to be guilty of the murder of her child, who could not prove, by at least one witness, that the child was actually born dead; a condition under certain circumstances obviously impossible, and thus rendering the statute unjust in its operation by confounding the unfortunate with the guilty. This act continued in force for nearly a century, but at length it became customary to require more direct proof of homicide; and by an act passed in the 43d of Geo. III. it was provided that trials for infanticide should be regulated by the same rules of evidence and presumption as were usual in other trials for murder; and thus the subject was brought more distinctly within the pale of medical enquiry.

Infanticide has been divided into feticide, or the destruction of the fœtus whilst yet in the womb, commonly called criminal abortion; and infanticide strictly so called, or the destruction of the life of the child either newly born or in the course of parturition. The present article will treat of the latter division only; and the evidence respecting it naturally divides itself, 1st, into that which has reference to the child, and 2dly, into that which relates to the mother. The investigation of the following questions will comprise the most material points of medical evidence:

1. Was the child born living or dead?
2. What was the cause of its death?
3. Has the suspected mother been recently delivered?
4. Do the phenomena presented by the supposed mother and child confirm the suspected relationship?

* Beobachtungen und Abhandlungen von österreichischen Aertzen, 3er. Band. Wien. 1823.

† Dissert. binæ de partu enecato, p. 336.

Writers on infanticide, in proceeding to discuss the first question in the enquiry, have generally deemed it necessary to prefix a statement of the development of the fœtus at the different periods of utero-gestation, a knowledge of which is requisite in proving the *viability* of the child, that is, its capability of supporting extra-uterine or independent existence. Some difference of opinion has existed concerning the precise period from which the viability of the child should be dated; but it is generally agreed on among medico-legal writers, that no well authenticated examples are recorded of children living which had been born before six months of utero-gestation.* An exception to this opinion may be thought to have occurred in a case recorded by Dr. Rodman,† who describes his patient as having been delivered at the end of the 19th week of pregnancy. The feebleness of the child would appear to justify the correctness of Dr. Rodman's opinion, for when three weeks old, it measured but eleven inches in length, and weighed two pounds and a half avoirdupoise, the clothes forming eleven ounces of this weight. But a case has subsequently been published by Mr. Baker, which renders it probable that Dr. Rodman was mistaken, for the child described by Mr. Baker,‡ although born undoubtedly at the full period of utero-gestation, corresponded pretty closely with the one alluded to by Dr. Rodman. The absence of all allusion to the external characters of the child in the latter instance prevents any reliance being placed on it. If the membrana pupilaris had existed, it may be reasonably presumed that it would not have eluded Dr. Rodman's observation, nor escaped remark.

A description of the leading phenomena which the organization of the fœtus presents from the fourth to the ninth month will include everything on the subject which can be interesting in relation to infanticide; and these phenomena relate to its length and weight, the proportional length of its parts, the state of the skin and its appendages; of the pupil of the eye; of the internal viscera, particularly of the abdomen; of the organs of generation; of the brain; and lastly, the progress of ossification. The weight and absolute length of the body furnish but uncertain data, since they vary much in different fœtuses at the same age. But Chaussier§ has pointed out an excellent criterion, founded on a very extensive examination of subjects, in the comparative length of its several parts at different periods. If in a well-proportioned adult a line be drawn from the top of the head to the heel, its centre corresponds with the upper edge of the pubis. But in the fœtus this central point is situated much higher; for in a mature child it corresponds with the umbilicus or a little above it;

at the end of the eighth month it is about an inch higher; at the end of the seventh still nearer the sternum; at the end of the sixth it falls just at the end of that bone.

The average weight of the fœtus at four months is from five to seven ounces; at five months, about a pound; at six months, two pounds; at seven months, from three to four pounds; at eight months from four to five pounds; at nine months the average weight in this country is about seven pounds,* the most frequent range being from five to eight pounds. Lecieux and Bernt have remarked that the length of children at the full period is less liable to variation than the weight. The following is a transcript of the table of the former.

Months.	Inches.
4	5 to 6
5	9½
6	12
7	14
8	16
9	18

And he agrees with Baudelocque in stating the extremes in mature children to be from sixteen to twenty-two or twenty-three inches.†

At the *end of the fourth month* the skin is rosy and moderately dense. The pupillary membrane is very visible; the meconium a little coloured, and occupying the commencement of the small intestines. The brain exhibits the interlobular furrow. There is a commencing ossification of the vertebrae of the sacrum. The kidneys are very voluminous, consisting of from fifteen to eighteen lobes, the suprarenal capsules being as large as the kidneys.

At the *end of the fifth month*, the scalp is covered with short silvery thinly scattered hair; the skin is of a deep red colour, but without sebaceous covering; the adipose membrane is but little developed; the nails are scarcely perceptible. There is commencing ossification of the first bone of the sternum, of the pubis and os calcis. The volume of the lungs is small, the heart is large, the ventricles little distinguishable from the auricles; the liver very large and near the navel, consisting of two equal lobes. The gall-bladder contains a little, almost colourless, serous fluid; the spleen is little developed and close to the stomach; the meconium is in small quantity, and only occupies the cæcum and a small portion of the colon. In the male fœtus the testicles are situated beneath the kidneys, near the lumbar vertebrae. In the female the ovaries are small, soft, elongated, very distinguishable from, and in a similar situation to, the testicles in the male. The brain on the surface is smooth, but several deep furrows and convolutions are now visible on the inner aspect of the hemispheres where they are applied to the falx cerebri.

At the *end of the sixth month*, all the external parts are very distinct. The skin is very

* Beck's Elem. of Med. Jurisprudence (Dunlop's ed.) p. 119.

† Edin. Med. and Surg. Journal, vol. xi. 445.

‡ Transactions of the Med. and Phys. Society of Calcutta, vol. ii.

§ Médecine Légale, &c. par Lecieux, &c. 1819. p. 17.

* Phil. Trans. vol. lxxvi. p. 394. Hunter's Anatomy of the Gravid Uterus, p. 68.

† Médecine Légale ou Considérations sur L'Infanticide, p. 11.

fine, of a deep red or even purple colour, particularly in the palms of the hands and soles of the feet, face, lips, ears, and breast. The stomach is filled with mucus; a part of the large intestines with meconium. The colon begins to exhibit its sacculated character. The testicles are still in the abdomen under the peritoneum. The bladder, hard, pyriform, and above the pelvis, has but a small cavity. About this period two points of ossification are formed in the second cervical vertebra; near the seventh month the superior point, which answers to the odontoid process, is larger than the inferior, which relates to the body of the bone. According to Tiedemann, the posterior lobes of the cerebrum now cover the corpora quadrigemina, and almost the whole cerebellum. The three cornua of the ventricles are quite distinct. The choroid plexus is very voluminous. The laminae of the septum lucidum are joined so as to form the fifth ventricle. The corpus callosum extends further backward, but does not yet cover the thalami and third ventricle.

At the end of the seventh month the skin is dense and fibrous, and is covered with the *vernix caseosa cutis*, unequally thick in different parts of the body. The pupillary membrane has disappeared. The hair is longer and of deeper hue; the nails are firmer, but do not extend to the ends of the fingers. The bile is yellowish and bitter. The meconium occupies a considerable part of the large intestines. The valvulae conniventes begin to appear. The testicles and ovaries are nearer the pelvis. The posterior lobes of the cerebrum now cover and extend beyond the cerebellum, and several furrows and convolutions are observable on the surface. The corpus callosum covers the thalami, and consists of transverse fibres passing from one hemisphere to the other. The corpora quadrigemina are divided by a transverse line or furrow rendering them complete and distinct, the two superior, or nates, being somewhat longer than the two inferior, or testes, and their parietes so thick that the iter a tertio ad quartum ventriculum may be considered perfect.

At the eighth month the skin becomes covered with very fine short hairs, the skin itself is denser and whiter, and the nails are firmer and more elongated. The sebaceous covering is more general. Oftentimes the breasts are projecting, and a milky fluid may be expressed from them. In the male the testicles are generally engaged in the abdominal ring. About this period the transverse processes have begun to ossify in the first lumbar vertebra. The structure and configuration of the interior parts of the brain, already completely formed, have only to be augmented in volume, the surface to be farther developed. The two hemispheres of the cerebrum extend backward considerably beyond the cerebellum. The hemispheres on each side are traversed with furrows, into which the folds of the pia mater enter, but these furrows, or the convolutions which they produce, are no where so marked as on the anterior and middle lobes.

At nine months ossification is more complete.

The descending ramus of the os pubis and the ascending ramus of the ischium are consolidated. Ossification has commenced in the first cervical vertebra, and also in the first bone of the coccyx. The body of the fourth lumbar vertebra, which is the most voluminous, is three lines in depth and six in breadth. The lateral portions of the six superior dorsal vertebrae begin to unite so as to form a ring posteriorly to the bodies of these bones. The bones of the cranium, although moveable, are in contact at their margins. Generally the testicles have passed the abdominal ring, or even descended into the scrotum. The nails are thicker and firmer, and are prolonged to the extremities of the fingers. Capuron states that the grey matter is now visible in the brain, but Tiedemann asserts that at no period is it possible to distinguish between the cortical and medullary substance in the fetus.

We shall not be understood to pretend that the preceding details will be found precisely to indicate the age of the fetus. Much variety is found in different children at the same age; but an attention to the criteria now laid down, particularly as they relate to the progress of ossification; to the development of the brain, and relation of the umbilicus to the centre of the body, for which we are indebted to Béclard, Tiedemann, and Chaussier, will enable the enquirer to form a tolerable approximation to the truth.

The advantage arising from the investigation of the anatomy of the fetus is, that it enables the enquirer to decide on the maturity or immaturity of the child, and to set at rest its capability of being born alive. If the child were mature, the greater is the probability of its having been born living; if immature, the likelihood of death from natural causes is considerable. And in either case it is creditable to the investigator, and indeed necessary in drawing up a medico-legal report on a child found dead, to indicate with some precision the age of the subject under examination.

I. At the time when concealment of birth and evidence of the life of the child were allowed to form conclusive proofs of the commission of infanticide, the enquiry, *whether the child was born living or dead*, was of paramount importance; and it is still one of considerable interest to the medical jurist and lawyer. The proof of the child having been born alive forms, in trials for infanticide, presumptive evidence in favour of the charge; whilst evidence of its having been still-born will confine the investigation to the proofs of death from criminal violence during parturition,—a species of child-murder commonly requiring the aid of an accomplice, and hence an infrequent form of infanticide.

The proofs of the survival of the child after delivery must be drawn from the phenomena of *respiration and circulation*, as it is chiefly by the performance of the former, and the changes which take place with respect to the latter, that the commencement and continuance of extra-uterine life are indicated. These phenomena relate principally to the colour of the

lungs, their consistence, specific and absolute weight, and their volume; to the contraction of the ductus arteriosus Botalli, and its diameter in relation to that of the pulmonary artery and its two great branches.

1. *Colour*.—The colour of the foetal lung is dark red, sometimes inclining to the brownish red of the liver, or the blueish red of the thymus; but in those parts of the lung in which respiration has had an influence, it is pale red or scarlet, unless they are gorged with blood, in which case it may be brownish or blueish red. From the experiments of Bernt* it results that artificial respiration in a dead child, if it change the colour at all, causes a pale or grayish red tint. In children who have breathed imperfectly, or only for a short time, the lungs on the anterior surface are of a pale red, on the posterior surface dark red, whilst in different parts of the lungs patches of scarlet red are visible. In children who have breathed perfectly and lived a longer time, the lungs are pale red with numerous patches and stripes of cinnamon or scarlet-red; posteriorly they present a dark red colour, owing to the subsidence of the blood.

2. *Consistence*.—The lungs, in the foetal state compact, become from respiration looser and expanded. They are vesicular on their surface, and air-bubbles or froth may be squeezed out of them. These are circumstances to be determined by the touch and sight, and result from their mechanical distention by the air. Three sources have been enumerated, besides natural breathing, from which air found in the lungs may be derived, namely, artificial inflation, putrefaction, and emphysema. The two latter produce vesicles which are superficial, large, and irregular, and which may be pressed out, so that the foetal lung will sink, which can never happen when the lungs have been distended by natural breathing or insufflation.

A general presumption only can be drawn from the consistence of the lungs. If they are soft and have a regularly vesicular appearance, respiration either natural or artificial must have taken place, and a reference to the other tests of independent life will show which of the two has happened.

3. *Specific gravity*.—It was known to Galen that the foetal lung sank in water, but that after respiration it floated, and these facts form the foundation of the hydrostatic test. Swammerdam affirmed that the lungs would float if only one inspiration had taken place, in which assertion he has been followed by Haller, Daniel, and Dr. W. Hunter.

But subsequent experience has shewn that the specific gravity of the lungs before and after birth does not observe an uniform ratio. It has been ascertained, first, that newly born children may live some time without respiration; secondly, that after respiration has been carried on for some time, the lungs are not

uniformly dilated, and occasionally to so trifling an extent only, that they sink in water, or sometimes that the lungs are unequally dilated or diseased; and thirdly, that in some still-born children the specific gravity is less than that of water, which may arise from breathing before complete birth, from artificial inflation, or extrication of air through other causes; and objections to the conclusiveness of the hydrostatic test have been alleged for these several reasons.

a. It is a fact familiarly known to all obstetrical practitioners, that children occasionally do not breathe till they have been born for some time; but there are no means of determining whether a child found dead could have been animated had the proper measures been resorted to. And the proof that a child so circumstanced had been murdered must rest on the evidence of existing mortal injuries, which it was morally impossible could have been the consequence of accident, but must have resulted from criminal violence. In short the evidence of murder in such a case must be similar to the proofs of infanticide during parturition.

b. But the lungs may sink, although the child have breathed for some time, owing to their imperfect dilatation. Craanen* described it as a frequent occurrence, and had the merit of pointing out how the fallacy might be obviated. He recommended that each lobe of the lungs be cut into small portions and thrown into water. If all sank, he inferred that the child died in utero; but if a few fragments floated, he concluded that the child had survived delivery. The imperfect dilatation of the lungs after respiration has been usually found in immature children, but cases have been related by Schenkus, Bernt, and others, of children born at the full time, and who had lived one or more days, whose lungs sank in water; and we recollect an example of the same kind which occurred to the late Dr. William Cullen of Edinburgh. The proceeding recommended by Craanen is, no doubt, applicable to all such cases; and the conditions of the ductus arteriosus Botalli and pulmonary arteries, to be hereafter noticed, would, in conjunction with other proofs, remove all doubts concerning the conclusiveness of the hydrostatic test in similar instances.

c. A diseased condition of the lungs may also prevent their floating after respiration, but it is extremely rare to find the foetal lungs in such a state of disorganization as to admit so little air that the whole lung will sink in water. Such a pathological state must be quite conspicuous, and the proceeding recommended by Craanen would easily obviate the fallacy, for if life had been maintained at all, some portion would float.

d. Hoffmann,† Bohn,‡ and Hutchinson,§.

* *Commentatio de Infantum nuper natorum Umbilico et Pulmonibus*, Auctore G. F. Daniel. Hallæ, p. 100.

† *Tom. vi. p. 213.*

‡ *Dantel, op. cit. 108.*

§ *Essay on Infanticide*, 1820, p. 52.

* *Experimentorum Docim. Pulmon. Hydrost. illustrantium Centuria I. curante Jos. Bernt, M.D. &c. Viennæ, 1823.*

have related examples of lungs which have sunk from congestion of blood in consequence of suffocation. The best informed pathologists, Meckel for instance, have doubted the possibility of such an occurrence, but the fact has been attested by the three authors just named. This is an objection to the hydrostatic test easily corrected, for after gently pressing out the blood, the lung will float. Thus, although the lungs may sink in a child which has outlived birth, the circumstances under which this may happen are known, and can be readily detected and allowed for.

It has been farther observed that the lungs in children notoriously still-born will sometimes float, and the circumstance has been adduced as a ground of objection to the hydrostatic test. Such floating has been ascertained to depend, first, on breathing before delivery, the child nevertheless dying before complete expulsion; and secondly, the lungs may be rendered specifically lighter than water by artificial inflation, by putrefaction, or by a species of emphysema, first noticed by Schmidt,* and subsequently more distinctly characterized by Chaussier.†

e. The possibility of uterine respiration was denied by all writers down to the time of Bohn.‡ He first maintained, in 1700, that in *difficult labours* a child may draw in air enough to suffice for the distention and floating of the lungs, and yet die before delivery. Bredenoil has related a remarkable example in Siebold's *Journal für Geburtshilfe*, Band I. It was a case of twins; the first child had been delivered by the forceps, the membranes ruptured, and the hand introduced to turn the second, whom he heard distinctly to cry for at least a dozen times. Bernt has mentioned four somewhat analogous cases. In a child delivered by turning and destruction of the brain, every fragment of the lungs floated.§ Of the other three cases, two fetuses were extracted after the mother's death, the vagina in the one and the neck of the womb in the other having been ruptured; and the third was extracted by the forceps on account of tedious labour. In these the lungs sank when entire, but many fragments floated, and in all the four examples every other test coincided with the hydrostatic to justify the inference that the children had respired. Until recently the evidence in favour of uterine respiration had been altogether supplied by German authorities; lately, however, Professor Marc has recorded an unequivocal example of the kind communicated to him by M. Henry, which has removed the scepticism formerly entertained on the subject by the learned professor, and others also we presume. A woman, having a deformed pelvis, and pregnant for the third time, was in labour on the 10th of October, 1827. M. Jobert was in attendance and called in M. Henry to his assistance. Having ascertained that the de-

formity occasioned an obstacle to delivery, M. Henry observes,*—"M. Jobert and I thought that it might be necessary to turn the child, but as the head did not appear to be very voluminous, we hoped to be able to disengage it by means of the forceps. That instrument was applied; and as soon as M. Jobert commenced the attempts at extraction, the fœtus uttered repeated cries during a dozen seconds, so distinct as to be heard by all the assistants. But as the head remained impacted in the pelvis, notwithstanding the efforts made with the forceps, we were obliged to desist from this attempt.

"Whilst we were discussing the necessity of turning the child, these cries were renewed as distinctly as on the former occasion, and in such a manner as could only take place in consequence of repeated inspirations. Finally, when introducing my hand to seize the feet, the moment it passed over the left shoulder the fœtus for the third time uttered cries, less prolonged than the preceding, yet sufficiently loud to be heard by all present.

"The delivery was completed with much difficulty, and the child did not breathe after its expulsion; but as the pulsations of the heart were pretty strong, we tried various means to resuscitate it, among others insufflation of the lungs. Our attempts were fruitless, for at the end of some minutes the circulation had ceased. I regret that I cannot describe the state of the lungs, but as insufflation was practised, an examination of them could not have afforded precise and unexceptionable information."

But the case now to be related proves incontrovertibly that these cries may be uttered by a child in utero, and subsequently born alive without assistance. It is described by Dr. A. F. Holmes, Lecturer on Chemistry and *Materia Medica*, McGill College, Montreal.† "On the 29th of November, 1828, I was called to a lady in labour of her sixth child. The fontanelle presented, but the pelvis being capacious, and her labours generally easy, no attempt was made to change the position. The head continuing to descend, the mouth lay on the pubis, and the examining finger could easily be introduced into it. The occiput did not yet occupy fully the cavity of the sacrum. At this time I heard sounds like the cries of a child whose mouth was muffled by some covering, but not being very distinct, and not being at all prepared for them, I thought, when they ceased, that they must have been produced by flatus in the intestines of the mother. In the course of a short time, however, the cries were repeated, and with the greatest distinctness, so as not to admit of a doubt that they proceeded from the child. The mother, much alarmed, enquired the cause of these noises, and required to be assured that they were not indicative of any danger. The pains being brisk, the head was soon forced down and expelled. The child was a female,

* *Neue Versuche und Erfahrungen*, &c. S. W. Wien, 1806.

† *Lecieux*, op. cit.

‡ *Daniel*, op. cit.

§ *Edin. Med. and Surg. Journal*, xxvi. 371.

* *Dict. de Médecine*, xii. 154.

† *Edin. Med. and Surg. Journal*, No. cii. 215.

and is still (August, 1829) alive and thriving."

The evidence for vaginal respiration is equally conclusive. Formerly Professor Marc* endeavoured to shew that, from the compression of the foetal thorax in the passages, it was impossible; but his reasoning must yield to the unquestionable testimony of Schmidt, Oslander, and Capuron, each of whom has witnessed it. In relation to infanticide it has been usual to disregard the vagitus vaginalis, as occurring only under circumstances which could not lead to doubt in the decision; either because it was only heard after the expulsion of the head when there could be comparatively but little difficulty on the part of the mother, and as little danger to the child in the accomplishment of complete expulsion; or that it occurred in presentations of the face and feet, in which delivery could not be completed without great difficulty or foreign manual assistance, and was therefore not likely to occur in medico-legal practice.

The experience of practitioners will not completely justify this view. It is undoubtedly for the most part true, that when the head is expelled, the complete birth of the child is attended neither with difficulty nor danger; but the case related by Dr. Hosack† proves that a child *may* perish after the expulsion of the head and before complete delivery, and that in the interval it may breathe and cry. The editors of the London Medical and Physical Journal‡ have observed a similar occurrence; and every practitioner of experience must have met with presentations of the face and feet, in which delivery has been completed by the unassisted expulsive efforts of the uterus.§

Uterine and vaginal respiration appear therefore to constitute a possible objection to the determination of the life of the child after birth, which may sometimes be insuperable. The correct objection to oppose to it, is the rarity of such a conjunction of circumstances as is indispensable for the occurrence; and the full expansion of the lungs, if present, would render such a plea more than doubtful.

The lungs may float from insufflation or artificial respiration, and Bohn|| and Camper¶ have quoted instances in which it had been successfully practised by blowing air into the lungs with the mouth. Schmidt** has investigated the subject of artificial respiration, and established the facility with which it may be practised. According to his experiments crepitation is always present, and the distention of the thorax is permanent, but the ratio of the weight of the lungs to the rest of the body remains as in dead-born children. The results of the *static* test, the colour of the lungs, and

the unaltered conditions of the ductus arteriosus Botalli and pulmonary arteries would distinguish insufflation of the lungs in a dead child from respiration, either natural or established artificially in a living one.

It is impossible to conceive, however, that a woman charged with infanticide, who had attempted to resuscitate her child by insufflation, could fail to produce satisfactory proofs of her innocence; for it may be reasonably presumed that a child subjected by a mother to such an attempt would not exhibit any signs of criminal neglect or wilful ill-treatment, whilst the attempt to inflate the lungs would form a presumption in favour of the accused. Morgagni* and Dr. W. Hunter have suggested that insufflation may be practised by another person from a malicious motive towards a mother; but were such an apparently incredible occurrence to happen, the results of the other indications of life would demonstrate by what means the lungs had been expanded.

"Medical jurists," says M. Devergie,† "have endeavoured to represent the inexperience of drawing positive conclusions from the evidence under consideration, by alleging that a woman may have inflated the lungs of her own child for the purpose of restoring it to life; or that another person may have done so from a criminal motive towards the mother. Such observations are just; but a multitude of cases occur where the circumstances in which the body of the child and the author of the crime are found, totally exclude them from consideration. For example, a child has been thrown alive upon the ice of the Seine, undoubtedly *living* at the time, for it presents all the signs of injury which can result from such a fall; another is found in the water, inclosed in a bag firmly sewed up; a third is thrown into the street, the mouth and pharynx filled with linen, so as to produce suffocation; a fourth floats on a river inclosed in a paper box, and so enveloped in linen as to prevent the access of air; a fifth has been thrown into a privy; a sixth dismembered and buried in an unfrequented situation. Certainly none of these proceedings could have been the act of a mother who had practised insufflation in order to restore her child to life, nor could it be attributed to a person, who, having wickedly simulated a crime, would have an obvious motive in proclaiming its apparent existence."

An objection to the hydrostatic test has been drawn from the putrefaction of the lungs, and the consequent floating from the air thus disengaged. Although this is an objection of very little practical importance, it has occasioned much controversy. Heister,‡ in 1722, observed the lungs of a child which had died in the womb, to float both whole and in pieces, and the known circumstances of the case proved that insufflation could not have been

* Manuel d'Autopsie Cadaverique, traduit par C. C. H. Marc.

† Beck's Med. Jurisprudence, p. 164.

‡ Vol. lxii. p. 423.

§ Heath's Baudelocque, ii. 224.

|| Beobachtungen und Abhandlungen von Oesterischen Aerzten. u. s. w. iii. Band, S. 45.

¶ Daniel, op. cit. p. 163.

** Neue Versuche, u. s. w.

* De sedibus et morborum causis, Epist. xix. art. 47.

† Dict. de Méd. et Chir. pratique, vi. p. 345.

‡ Bernt, in Abhandlungen und Beobachtungen, S. 56.

practised. Haller* instituted experiments on the subject. He allowed the lungs of a dead-born child to become putrid in water, and saw them float after seven days in the same water. The colour was changed from dark to light red, and they were covered with air-bubbles. A dark-red compact-feeling lung out of another body, already powerfully offensive, sank both entire and in pieces. He concluded, therefore, that considerable putrefaction was necessary to cause the floating of the lungs. Camper had previously made the same remark, and had found that, when the whole body was so far advanced in putrefaction that the joints separated with the slightest touch, the lungs had only begun to decay, and would not float in water. Jaeger, from experiments and observations on the difference between sound and putrid lungs, drew the following conclusions: a lung which floats from putrefaction is distinguished from one which does so from breathing, by the situation of the former against the spine, by its dark-red colour, and by the air being found under the outer membrane in the form of bubbles,† and by the easy escape of the air after cutting into the lungs and the subsequent sinking of them. The air developed by putrefaction he found to escape with much facility by means of incisions and gentle pressure; not so in those which floated from respiration. Mayer‡ also engaged in an extended series of experiments on the putrefaction of the lungs. He found that, on placing the lungs of still-born children in water, in the course of two or three days their colour changed, and they increased in volume. By the eighth day at latest they floated, both whole and cut into pieces, in the water in which they became putrid, but, transferred to clean water, although they still floated, yet on the slightest compression they sank. The rays of the sun accelerated the putrefaction, but a current of air retarded it, so that they did not float until the tenth or eleventh day. After having once floated, they continued to do so, emitting daily a more offensive odour and acquiring an increased volume, until the twenty-first or at latest the thirty-fifth day. After that period they gradually sank down, without a single exception, to the bottom of the vessel, nor did they afterwards in the least float, although kept for seven weeks or even longer. Beck§ and Orfila have confirmed these results of Mayer, to which M. Devergie has added the following interesting practical correction. Referring to the above experiments, M. Devergie observes:¶ “Although the above experiments appear incontestible, an accidental circumstance may completely change their results, so true is it that practical deductions drawn from experiments are frequently liable to error. In the number of the *Annales d'Hygiène et de*

Médecine Légale for Oct. 1830, I published two cases of infanticide submitted to my examination, in which putrefaction of the lungs with development of gas was evident. The children had been thrown into the Seine, remained in the water seven or eight days, and subsequently exposed to the air from twenty-four to thirty-six hours before being opened.

“It is ascertained that, whenever a person drowned is taken out of the water after having been submersed for ten or fifteen days, if the temperature of the atmosphere ranges between 15° and 25°, a considerable development of gas takes place in the body immediately on its exposure to the air. In consequence of this disengagement of aeriform fluid, which takes place not only in the subcutaneous tissue, but even in the internal organs most protected from the agency of the atmosphere, the fluids of the body are conveyed to the surface, bullæ are formed, sanies exudes from the cutaneous pores in general, and escapes also by the natural openings. In a great number of bodies the development of putrid gas is so considerable as to effect an alteration in the posture of the limbs, and even to change the general position of the body. Thus, it has been found necessary to secure the bodies, publicly exposed at the *Morgue*, to the tables on which they are placed. Before this precaution was adopted, the bodies occasionally fell to the ground; and strangers frequently hastened to inform the porter that an individual placed there was not dead, for they had seen him move.

“The phenomena observed in the body of an adult found drowned, develop themselves with equal or greater rapidity, under the same circumstances, in the fœtus. Now it is very rare that a medico-legal examination of a body takes place, before the *procureur de roi* (in England the coroner) has been informed of it; hence at least twenty-four hours generally elapse, during which period the body is undergoing the changes indicated above, and the lungs become as emphysematous as possible.”

We have said enough, however, to shew that air developed in the lungs by putrefaction must be an extremely rare event, that it is easily recognized, and any fallacy arising from it readily avoided.

Alberti* in 1728 threw out a hint that the lungs sometimes contained air which was derived neither from putrefaction nor respiration. In 1806, Schmidt† confirmed the observation, remarking that bubbles of air appear in the lungs which do not betray the least trace of putrefaction, and that they are thereby rendered capable of floating. The same phenomena occurred to the observation of Chausier,‡ who suggested the following method of obviating the fallacy: “In these instances,” says he, “the aeriform fluid is contained in

* *Bernt*, in *Abhandlungen und Beobachtungen*, S. 56.

† See *Hunter*, *Med. Observations and Inquiries*, vol. vi. p. 284.

‡ *Schlegel's Collectio Opusculorum*, vol. i.

§ *Medical Jurisprudence*, p. 157.

¶ *Dict. de Méd. et Chir. prat.* vi. p. 342.

* *Daniel*, *op. cit.* p. 120.

† *Neue Versuche*, u. s. w.

‡ *Lecieux*, p. 56.

the cellular tissue of the lungs, whence it may be expelled by pressure, after which the lungs thrown into water immediately sink. This does not happen if the air was contained in the minute air-cells."

The preceding observations include all the objections alleged against the conclusiveness of the hydrostatic test as a proof of extra-uterine life. If we except the rare and barely possible occurrence of uterine or vaginal respiration, it must be evident to every candid mind that these objections possess neither conclusiveness nor force; and that the circumstances on which they depend can be so easily and fully appreciated as to avoid any error which could lead to the crimination of the innocent. Of the considerations to be opposed to the *vagitus uterinus* we have already spoken, and shall again advert to them before the conclusion of this article.

4. *The difference between the weight of the lungs before and after natural respiration.*—This constitutes the *static test* first proposed by Ploucquet* in 1777. Experience, however, soon shewed that this test was limited in its practical application, since, in some children who had lived several days, the weight of the lungs proved to be less than that frequently observed in still-born children. It was, therefore, suggested to substitute as a criterion, the *relative* weight of the lungs, before and after natural respiration, to the whole body. But the experiments and observations of Chaussier, Schmidt, and Bernt, have shewn the inutility of this modification of the static test, by pointing out that in many still-born children the ratio was a lower one than the average for children who have breathed, and vice versa. Schmidt, seeing therefore that this method was not an improvement, proposed to return to the original mode of judging by the *absolute* weight of the lungs, and to confine the application of the static test in this form to those cases in which the weight is such as is never attained by the natural and healthy *fœtal* lung. In twenty-four still-born children examined by Bernt,† the greatest weight of the healthy lungs was 993 grains, and he states the medium at about 550 grains. The form of the static test recommended by Schmidt is very limited in its application for the lungs of children who have outlived delivery; not more than one in six or seven equal the former weight. When the *fœtal* lungs, being naturally formed and of healthy structure, exceed 1000 grains, such weight may be considered as constituting decisive proof that the floating of the lungs and their loose and expanded appearance do not result from insufflation practised on a dead child, but must be a consequence of the continuance of respiration and of the circulation

of blood through them, and therefore of life; and even if the weight exceed in any considerable degree 550 grains, the same inference is a reasonable presumption.

5. *Size of the lungs.*—As respects the volume or circumference of the lungs, it is observed by Bernt* that naturally formed and healthy *fœtal* lungs which have not respired, occupy the posterior part of the thorax, merely touching the pericardium with their anterior borders. The posterior half only of the arch of the diaphragm is covered with them: the edges are sharp, the margins of the right, middle, and left upper lobes forming small pointed, tongue-shaped elongations. If, however, the child have lived a very short time after birth, and breathed only imperfectly, the lungs are found to occupy the lateral parts of the thorax also; their anterior borders and the tongue-shaped elongations of the right, middle, and left upper lobes are become round either partially or altogether. After full and complete respiration the lungs entirely fill the lateral cavities of the thorax; their anterior borders cover the sides of the pericardium, and their concave surface the whole arch of the diaphragm; their borders are every where rounded, and the tongue-shaped prolongations of the right, middle, and left upper lobes are short and obtuse.

6. *State of the ductus arteriosus.*—Passing over the changes which take place in the foramen ovale, the ductus venosus, and umbilical vessels, changes which take place at too late a period after birth to supply satisfactory evidence in trials for infanticide, we come to the consideration of the comparative state of the ductus arteriosus Botalli, and the branches of the pulmonary artery before and after respiration. Previous to the investigation of Bernt no minute observations had been made on the changes which these vessels undergo soon after delivery. It might have been anticipated that the occlusion of the ductus arteriosus must be rapid, since its perviousness would form an impediment to the perfecting of the child's new mode of existence, but it had not occurred to medical jurists to seek for any indication of extra-uterine life from this source.

In the *fœtus* the ductus arteriosus proceeds from that part of the trunk of the pulmonary artery where it divides into its two great branches, and running parallel with the arch of the aorta and in contact with it, joins it at a very acute angle. It is about half an inch long, cylindrical, equal in diameter to the trunk of the pulmonary artery, and almost three times the diameter of its two branches, each of which branches is about the thickness of a crow-quill.†

If the child, says Bernt, have breathed for a few moments only, the aperture by which the duct enters the aorta becomes oval; if a little longer, it loses its cylindrical form, and

* Abhandlung über gewaltsame Yodesarten, L. 153-156.

† Experimentorum Docimasiam, &c. Edinburg Medical and Surgical Journal, p. xxvi. p. 375. Handbuch der gerichtlich. Arzneikunde, u. s. w. von J. Bernt, Wien, 1828, s. 256.

* Handbuch, 266.

† Experimentorum Docimasiam, &c. Proleg. p. xiv. Handbuch, 277.

assumes the shape of a cone, the apex being at the aortal end, but sometimes, though much more rarely, at the opposite extremity; the diameter is diminished so as to be smaller than that of the trunk, but about equal to that of the two branches of the pulmonary artery, the latter, owing to the establishment of the pulmonary circulation, having already increased in diameter.

If the child have lived for some time, and breathed perfectly, the ductus arteriosus Botalli resumes the complete cylindrical form, but has become shorter, and is not thicker than a crow-quill, whilst the two pulmonary branches are thicker than a goose-quill. As these comparisons are determined by the relative size of objects situated close to each other, an observer would not be liable to fall into error, as he is otherwise apt to do in estimating relative magnitude.*

The observations and experiments on which the preceding inferences relative to the blood-vessels are founded, were made previous to the year 1823; and in the Manual of Medical Jurisprudence published in 1828, Professor Bernt adheres to the same conclusions, and informs us that they have been confirmed by the observations of Kilian,† a writer of authority on the fetal anatomy. As we have attentively examined these observations and experiments, which are seventy-five in number, and not been able to concur with Bernt in his inferences in every particular, we shall briefly state those which appear to be conclusive, and of practical application in medico-legal inquiries.

In every instance of respiration, whether naturally accomplished or the effect of resuscitation from insufflation, a general or partial diminution of the diameter of the ductus arteriosus was found. But a diminution in general diameter (so that the natural relative diameter between the ductus arteriosus and the trunk and branches of the pulmonary artery did not exist) was sometimes found in children notoriously still-born, and who had not breathed artificially; hence a smaller relative diameter of the duct cannot be relied on as a proof of extra-uterine life. But the contraction of the extremity (either aortal or otherwise) of the duct, though sometimes absent in children who had respired, was never present unless respiration had been carried on; so that, if the ductus arteriosus represent a cone in figure, it may be regarded as a decisive indication of the continuance of the pulmonary circulation, and hence of breathing.

Having now investigated the evidences of independent life, which may be supplied by the examination of the body of a child found dead, we proceed to arrange the inferences of practical value in a compendious form. The state of the stomach, bowels, and urinary bladder, and of the umbilical cord, has been

purposely omitted, as in a large majority of cases they do not furnish any indications which can be relied on.

First.—A child may be concluded to have been still-born who does not present the signs of having arrived at the sixth month of uterine life: or

The colour of whose lungs is uniformly dark-red, or verging towards the brown-red of the liver or bluish-red of the thymus:

If they are of a fleshy compact structure, somewhat like liver, presenting no traces of cells on the surface, nor yielding a crepitating sound when cut, nor bubbles of air when portions of them are pressed beneath the surface of water:

If the whole lungs and every fragment when they are cut into small pieces immediately and rapidly sink in water; and when the weight of the whole lungs (being naturally formed and healthy) is below five hundred grains:

If the lungs have occupied the posterior cavities only of the thorax, merely touching the pericardium with their anterior borders, and covering with their concave surface the posterior half of the arch of the diaphragm, the edges being sharp, and the margins of the right, middle, and left upper lobes forming small tongue-shaped elongations: and if the ductus arteriosus is cylindrical throughout, being of equal diameter with the trunk of the pulmonary artery, and two or three times the diameter of the two pulmonary branches.

Secondly.—It may be concluded that a child has lived a short time and breathed imperfectly,

Whose lungs being for the most part dark-red, brownish, or bluish-red, present, here and there, in one or both lungs, but particularly on the edges, insulated scarlet or cinnabar-red spots or streaks; when there are visible, particularly in the upper lobe and edges of the right lung, insulated groups of cells surrounded by portions retaining the compactness of liver; when this cellular portion yields a crepitating sound on being cut, and bubbles of air if pressed under water; when the lungs occupy more or less the lateral cavities of the thorax, and their margins, particularly the prolongations of the right middle and left upper lobes, are partially or altogether of a rounded form:

When the lungs, with or without the heart, sink in water, but some fragments of them, when divided, float, even after having been subjected to pressure; and when the absolute weight of the lungs much exceeds five hundred grains:

If the ductus arteriosus is smaller in diameter than the pulmonary trunk, and about equal to the pulmonary branches, and particularly if with these signs it is contracted either at the aortal or other extremity, so as to assume a somewhat conical shape.

Thirdly.—A child may be concluded to have lived for some time and breathed perfectly,

If the lungs are of a pale red colour gene-

* Edinburgh Medical and Surgical Journal, vol. xxvi. p. 378.

† Abhandlung über den Kreislauf des Blutes im Kinde welches noch nicht geathmet hat. Karlsruhe, 1826.

rally, but with numerous spots and streaks of scarlet; the posterior surface only being dark red, in consequence of the gravitation of the blood to that part:

If the lungs completely occupy the lateral cavities of the thorax and cover the sides of the pericardium, and if their lower concave surface cover the whole arch of the diaphragm, their edges being every where rounded, and the tongue-shaped elongations of the right middle and left upper lobes short and obtuse: if insulated groups of innumerable cells distended with air are visible with the naked eye in the substance of the lungs; if they are every where expanded and spongy in texture, crepitating audibly when cut, and yielding, on pressure under water, numerous bubbles of air or bloody froth:

If the lungs connected with the heart, or separated from it and each separate lobe, project above the surface of the water, and every fragment, when they have been divided and subjected to strong pressure, float; and if their absolute weight exceed one thousand grains:

And if the ductus arteriosus is short and much contracted in diameter, so as to be as small as or smaller than the branches of the pulmonary artery; or if it be decidedly contracted at the aortal or other extremity, so as to represent in form a truncated cone.

To every indication, hitherto adduced, of the extra-uterine life of the child, the possible occurrence of uterine or vaginal respiration presents an objection which deserves farther consideration. In the preceding remarks we have adverted to cases of this kind, which refute the opinion hitherto entertained that this species of respiration cannot come in the way in medico-legal investigation, because it can only occur in cases requiring instrumental or, at least, foreign manual assistance. Although there can be no doubt of the general correctness of this opinion, it is manifestly not true in all instances; for the cases of Dr. Hosack and Dr. Holmes* prove that it may be met with in instances of delivery capable of completion by the natural efforts only.

Admitting, however, the possibility of intra-uterine and vaginal respiration, we must contend on the other hand for the extreme rarity of the occurrence; so rare, indeed, that, until very recently, it has been regarded with the greatest distrust by European practitioners in general with the exception of the Germans; and it is doubtful whether any other positive evidence than that recorded in the present essay, exists in the writings of French and English authors in its favour. Ought, then, so rare an occurrence to be admitted as a decisive reason for uniformly rejecting the conclusiveness of the indications of life which we have hitherto been discussing? We think not, and doubt extremely whether the signs of *perfect* respiration which we have just detailed are ever to be met with in such cases; whilst we have every reason to believe that they are commonly found in the bodies of children

who have died from criminal violence or neglect.

Vaginal respiration may occur in natural presentations, but the delivery in such a case must be *delayed* to admit of it, and thus the labour would become "difficult." In every such case the tumour of the vertex would plainly indicate its nature. Face presentations, in which vaginal respiration may occur, are capable of proof from the absence of the tumour just named, and from the tumid and distorted features; and footling presentations are recognizable, if death have taken place soon after birth, by signs not difficult of detection. Such are the cases most favourable to the possible occurrence of vaginal respiration; and although they demand full consideration, they seem nevertheless capable on careful inquiry of tolerably easy detection. Should there be no proofs of difficult labour, whilst indications of full and complete respiration are found, and conjoined with these there exist signs of fatal injury, which could not have been accidental, and must have been inflicted during the continuance of the circulation, the proofs of infanticide would be indubitable; for to reject them would be to disallow the force of the strongest circumstantial evidence.

II. In proceeding to inquire into the *cause of the death of the child*, we may remark that it may have died in the womb previous to the commencement of labour; or during the act of parturition, or after birth; and in each case death may have been produced by natural or criminal causes.

1. The death of a fetus in utero criminally induced in the early periods of utero-gestation, falls under the head of criminal abortion; at a later period death arises most frequently from natural causes, from disease in the mother, in the fetus itself, or in the secundines; but it may result from premature labour brought on artificially by puncturing the membranes.

A fetus having died in utero, may remain there an indefinite time, and even be converted into adipocere. Generally it is expelled from five to twenty days, exhibiting unequivocal signs of putrefaction; the members are relaxed, the muscles flabby, the epidermis detached by the slightest touch, the skin is of a purplish or brownish-red. Frequently there is a sanguineous or serous infiltration of the whole subcutaneous tissue, particularly under the hairy scalp. The umbilical cord is thick, soft, brittle, and infiltrated. The chest is sunken or flattened. The head is deformed, falling flat by its own weight; the pericranium and dura mater are separated from the bones, which are nearly, if not altogether, disunited, and the cerebral substance is converted into a putrilaginous mass. Jaeger observes that these signs are quite peculiar, and that their concurrence distinguishes this state from death by injury, and every thing else.*

* See page 686.

* Schlegel, "Opuscul. Collectio V. 48. Lecieur.
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2. Capuron,* who has given the best summary of the causes of death during parturition, has divided them into innocent and criminal.

Of the former kind are difficult labour with premature evacuation of the liquor amnii; total or partial separation of the placenta; premature expulsion of the funis; presentation of the feet; detention of the body from malposition after the expulsion of the head; and the "entortillement," or turning of the funis around the neck of the child.

The effects on the child of difficult labour with premature evacuation of the liquor amnii, are such as result from severe and continued pressure; and the death of the child takes place in the way of apoplexy. The signs which indicate it are the *séro-sanguineous* tumour of the vertex; if the head have presented, deformity and elongation of the head, attended even with fractures of the bones, tearing of the membranes, or separation of the pericranium and effusion under it.† The position of the injuries of the head, and the absence of any distinct sign of impingement from a bruising body, combined with the absence of the signs of respiration, would satisfactorily elucidate these phenomena.

In the case of total or partial separation of the placenta, the death of the child is of course from hemorrhage, and the body would present the signs of *anæmia*. It might be confounded with death from hemorrhage from the umbilical cord; but the absence of the signs of respiration would be a decisive means of discrimination. The mother would also present signs of *anæmia*.

In premature expulsion of the funis, the death of the child is from asphyxia. No sign of injury would be present, nor would there exist any proof of respiration.

Presentation of the feet, with all but the head expelled, and the delivery tedious: in such a case a woman might assist herself, and in so doing inflict so much injury on the child by her injudicious attempts, as to excite strong suspicion against herself; and the more particularly, as this is a conjunction of circumstances under which vaginal respiration may occur. Such a case would require a circum-spect observation of all the particulars; but there are circumstances which could scarcely fail to lead to its correct elucidation. The indications of difficult delivery and of the presentation of the feet would be easily observed, and an examination into the situation and nature of the injuries would show whether they were of a kind which a woman might be expected to inflict on her child in promoting her own delivery. If death were not the result of injury, it would take place in the way of apoplexy, and the corresponding signs would be found.

In retention of the body from malposition or otherwise after the expulsion of the head, death results from asphyxia, from the com-

pression of the funis, if the child have not breathed; and if it have, from impediment of the free expansion of the thorax. In the former the absence of the signs of respiration, with the want of proof of criminal neglect or violence, would rebut the charge of infanticide; in the latter, imperfect respiration would be recognised by its appropriate indications, the severity of the labour would be proved by the tumour of the vertex and other signs, and the want of proof of criminal act or intention would render the charge of murder untenable.

The only other innocent cause of death during parturition deserving of particular attention is the "entortillement" or turning of the funis around the neck of the child. If this circumstance lead to fatal consequences, it is either by inducing apoplexy or asphyxia, according as respiration have or have not been carried on. Should any sign of injury be left, it will consist of a spiral impression, or (if the cord have passed round more than once) of the circular and spiral line discoverable on the neck. The epidermis is never puckered, nor the cartilages of the trachea injured. If it were alleged that the cord have passed round the neck more than once, it should be ascertained whether it was sufficiently long for that purpose.

It is proper to add that fractures of the bones sometimes take place in the uterus, of which Chaussier* has related a remarkable instance. In this example each of the long bones presented one or more fractures, some of which were recent, others beginning to unite, and others had united.

The criminal causes of death during parturition are various, and for the most part evidently betray the intention with which they were employed. They almost always imply the aid of an accomplice, and hence are of comparatively infrequent occurrence. Of these the following are the most usual:—puncture of the brain through the fontanelles or sutures, or of the spinal marrow between the first vertebra and the occiput; torsion or compression of the head; detraction; strangling and suffocation.

Belloct† has reported an instance of child-murder in which the brain was punctured through the anterior fontanelle. The external wound did not exceed half a line in length. On examination it was discovered that it penetrated the brain to the depth of two inches. At this point the cerebral substance was lacerated in several directions. Blood was effused both between the membranes and in the left lateral ventricle. Gui-Patin, Alberti, and Brendel have cited similar examples; and in the article *ACUPUNCTURE* in this *Cyclopædia* reference is made to a trial in the "*Causes Célèbres*" for the same horrible offence. It is doubtful, however, whether these means

* *La Médecine Légale relative à l'art des accouchemens.*

† *Fodéré*, iv. 503.

* *Bulletin de la Faculté de Médecine*, tom. iii. See also Otto's *Handbuch der Pathologischen Anatomie*, 394.

† *Cours de Méd. Lég.* 101.

would prove so rapidly mortal as to destroy life before the expulsion of the child. In the case related by Belloc, death appeared to have been produced by suffocation, the laceration of the brain not having been effectual.

In torsion of the neck the injury inflicted on the spinal marrow might be immediately fatal. The marks of violence presented by the ligaments of the vertebræ and neighbouring muscles would indicate the nature of the case; and it is highly probable that the marks of the pressure of the fingers would be visible.

Foderé* has related the trial of a widow who destroyed her child in the act of parturition by compressing its head between her thighs till it was dead.

It is doubtless possible that a child may be strangled or suffocated before complete respiration has taken place; but the nice accomplishment of such a purpose requires a more refined application of injury than is almost ever practised; and without such caution the remains of intentional injury would be demonstrable. If strangulation were attempted whilst the circulation was proceeding vigorously between the mother and child, continued pressure would be necessary for its accomplishment, as death would take place in the way of apoplexy; and for such continued pressure a longer intermission of uterine pain would be required than is usually found to occur.

3. The causes of death after delivery are natural or criminal; and the latter are subdivided into those which are fatal by omission and by commission.

The following is a general summary of the natural causes of death after delivery:—immaturity, disease, malformation; omission of the usual and necessary attentions; injuries from severe labour or from sudden expulsion; sudden and simultaneous expulsion of the placenta, and consequent hemorrhage; prevented respiration from envelopment in the membranes; or suffocation in the discharges. The two causes last enumerated are not distinguishable from the same causes of death intentionally applied. Of the others, injuries from severe labour and from sudden expulsion are most likely to be confounded with the effects of criminal violence, and hence demand the most careful and deliberate examination. With reference to the former, it should be recollected that “fluid blood effused at the base of the brain is met with in all children, when the head has been long in the pelvis, and the child has died in that situation.”† The cerebral ventricles of newly born children, Foderé adds, usually contain much reddish serum, and the brain much blood. And when the superior aperture of the pelvis is narrowed by deformity, even fractures of the bones may occur with depression of them into the brain. But all these effects require for their production a disproportion between the size of the head and dimensions of the pelvis. The state of the

former should indicate the difficulty of the labour by its deformed and elongated appearance, and by the unusual size of the sanguineous tumour at the vertex. Signs of laceration and contusion ought not to exist.

Injuries arising from sudden expulsion are very rarely fatal, or even dangerous; and they are less likely to be confounded with the causes of infanticide, inasmuch as they are of infrequent occurrence in first labours, on which occasions the crime is for the most part perpetrated. No instance of the death of a child from sudden expulsion has come within our knowledge. Suffocation in privies under such circumstances is of course possible, and Hutchinson* says instances are reported; he has not, however, supplied any reference to them. Several years ago Chaussier† experimented on dead children to ascertain the effects of falls from a given height, and also of blows, on the cranium. These experiments, neither very refined nor conclusive in their character, are superseded by the more recent observations of M. Klein‡ of Stuttgardt. M. Klein, taking advantage of his situation of Member of the Superior Council of Health, caused a circular to be addressed to the midwifery practitioners of the kingdom of Wurtemberg, requiring reports of the cases of sudden expulsion of the fœtus which might be observed by them. Returns were made of one hundred and eighty-three cases. Of these, one hundred and fifty-five children were expelled whilst the mothers were in the upright posture, twenty-two when sitting, and six when on the knees. Twenty-one happened at the first labour. Of the whole number not one child died; no fracture of the bones took place, nor any other severe injury. Two only suffered temporary insensibility, and one an external wound with sugillation over the right parietal bone. Not one suffered from umbilical hemorrhage, although in several the cord was ruptured at four, three, and two inches, and even one inch from the umbilicus. In twenty-one children it was torn off close to the abdomen, yet no serious hemorrhage followed. We are entitled, therefore, to conclude that in accidents of this kind the death of the child, if not impossible, is highly improbable; and if it should occur, we have no reason to think that it would be immediate.

The criminal causes of death by omission are, the neglect of removing the child from under the bed-clothes, or from the state of supination; the want of suitable warmth; neglect of nourishment; and the neglect of the ligature of the umbilical cord.

Death has resulted not unfrequently from the first of these causes; but the medical man possesses no peculiar means of determining whether this has happened from design or from the mother's inability to render the usual succours. Dr. William Hunter has mentioned

* Vol. iv. p. 524.

† Foderé, iv. p. 503.

* Dissertation on Infanticide.

† Lecieux, op. cit.

‡ Dict. de Médecine, tom. xii. p. 188.

a case which shows how readily neglect of this kind may prove fatal.

Death from want of suitable warmth, which is almost always conjoined with public exposure, is proved by the evidence of respiration and circulation; by sanguineous congestion in the large vessels, with comparative absence of blood in the superficial ones; by the position of the body; and most conclusively perhaps by the *cadaveric congestion or lividities** which are met with in the depending parts of the body.

Neglect of nourishment is also generally combined with public exposure; under which circumstances death may be attributable to the combined causes. It would be very difficult to prove the death of a newly born child from neglect of nourishment only, because to establish that it would be requisite to show how long the child had lived, which there are no means of determining with strict accuracy. The changes supervening in the umbilical cord would furnish the best evidence; and being applicable on other occasions, we shall describe them in this place.

The umbilical cord varies in different children considerably:† in some it is slender and comparatively firm, in others thick and soft; the thickness varying from the greater or smaller quantity of the albuminous fluid, called the gelatinous fluid of Warton. The changes which take place in the cord are, first, flabbiness, then dessiccation, and lastly separation from the abdomen; and all these processes occur at different periods of time in different children, according to the thickness or thinness of the cord. Immediately after birth, or at farthest in a few hours, the flabbiness commences, and it is complete in the course of a day, or at most in two days. Dessiccation, which commences after the fading of the cord is complete, begins generally at the end of the first day, and is completed on the fourth or fifth, when the separation takes place. The dessiccation is a purely physiological phenomenon, for it does not take place in children born dead; in them the cord remains soft and flexible, and then becomes putrid. The dessiccation of the cord is more speedy when it is thin; and it is rare that separation of a slender funis is attended by suppuration, or even inflammation. When it is thick, the case is otherwise; suppuration at its junction with the abdomen takes place, with a red and thickened base. The slowness of the separation appears to occasion the inflammation.

A consideration of these circumstances will indicate the age of a child approximatively within the first four or five days after birth.

The neglect of the ligature of the umbilical cord may be accidental or intentional. The absence of it is unfavourable to the accused, and more particularly if the funis be cut. The effects of the absence of the ligature of the umbilical cord have been a fruitful source

of controversy; many, Capuron among others, having doubted whether fatal hemorrhage could result if the ligature were not applied.* Foderé† has related a case which we deem quite conclusive in the affirmative; and the signs he has described will no doubt be generally met with under similar circumstances. They were the following:—extreme paleness of the whole body; no wound or external sign of violence; the umbilical cord flaccid; floating of the lungs with or without the heart; complete vacuity of the heart and great vessels, of the vena portarum, of the ductus venosus, and even of the capillary vessels. All the blood which could be collected did not weigh two ounces. The child lived long enough to be carried three leagues; hence death from this cause is not speedy, and the signs of respiration would be certainly found.

Röederer has remarked that the ligature may be applied to the cord after fatal hemorrhage for the purpose of deception, but the proofs of anæmia would elucidate the case. If three ounces of blood can be collected, it may be presumed that the child has not died of hemorrhage. In Foderé's case not two ounces could be collected.

We now pass to the consideration of the causes of death after delivery *by commission*; and it is commonly in this manner that infanticide is perpetrated in this country. They may be as various as those of homicide generally; but there are some which are more easily or more commonly employed than others. The following enumeration embraces the more usual and important varieties. Suffocation from division of the *frænum linguæ* and turning back of the tongue; stoppage of the aerial passages; asphyxia by strangulation or by deleterious gases, or by plunging into privies; torrefaction; drowning; wounds and bruises about the head or in different parts of the body; crushing of the head; punctures per rectum or in the region of the heart: to which may be added some of the causes mentioned under the criminal means of death during delivery. The criminal intention in many of these injuries would be self-evident. A recent case of infanticide in Guernsey was perpetrated by laceration of the *frænum linguæ* and puncture per rectum.‡ The proofs of murder were unquestionable.

The effects of injuries about the neck demand the strictest scrutiny; for strangulation is perhaps the most frequent of all causes of infanticide by commission. The fallacies by which it is beset are the "entortillement" of the umbilical cord; supposed injury from compression by the os uteri and vagina; or from the assistance which a woman might endeavour to render herself; possibility of post-mortem injury; and livor, or spontaneous suffocation.

The turning of the umbilical cord around the neck requires that the funis should be of

* *Chaussier*, *Recueil de Mémoires*, &c. 424.

† *Traité des Maladies des Enfants*, &c. par Billard, p. 18.

* *Daniel*, *Commentatio de Infantum nuper natorum Umbilico*, &c. 1780.

† *Tom. iv. p. 516.*

‡ *Edin. Med. and Surg. Journal*, No. cvii. p. 458.

a certain length;* and the mark, if any remain, cannot be circular unless it have made a second turn. No abrasion or puckering of the skin ever takes place from this cause.† M. Klein,‡ who has made special observations on the subject, denies that any sugillation or even impression ever occurs from compression of the neck by the cord, by the os uteri, or vagina. He has seen many children who have died from the first of these causes; and in none did he observe any mark left about the neck. But in infanticide, as in homicide generally, criminal efforts to extinguish life are executed most frequently with characteristic violence, and accordingly injuries of the tracheal cartilages or of the deep-seated muscles of the vertebræ are sometimes found, or plain impressions of the fingers. A few years ago we had occasion to examine the body of a child which had been destroyed by strangulation with the fingers. The impressions were distinctly perceptible on each side of the trachea, and the mark of the fingers gradually increased in distinctness from the back of the neck forwards. The trachea was not injured, but on each side of it coagulated blood was found.

The assistance which a woman might have endeavoured to afford herself would be generally recognizable by the nature, situation, and direction of the marks. The case of Marguerite Granger, related by Foderé,§ affords an excellent, perhaps an extreme illustration of the kind of injury which might be expected in such a case; and his report shows that, though such injuries may be numerous, they will be superficial.

Chaussier|| asserts that injuries have been inflicted on the dead body for the purpose of determining an accusation against an individual. If such wounds or bruises have not been inflicted for twenty-four hours after death, there is no difficulty in deciding that they were not received during life. The lips of wounds are pale, without swelling or retraction. There is no clot of blood adhering to the surface, nor, in the case of contusion, is coagulated blood found in the surrounding cellular texture: hence there is no tumour. The characteristics of blows inflicted during life are tumour from extravasation of blood and serum; or clots of blood in the subjacent cellular tissue without tumour, or "incorporation of the blood with the whole thickness of the true skin, rendering it black instead of white, and increasing its firmness and resistance."

"In respect to external contusions," says Dr. Christison,¶ "experiments show that for some hours after death blows will cause appearances which in point of colour do not differ from the effects of blows inflicted recently before death; that the discolouration generally

arises like lividity, from an effusion of the thinnest possible layer of the fluid part of the blood on the outer surface of the true skin, but also from an effusion of thin blood into a perceptible stratum of the true skin itself; and that dark fluid blood may be even effused into the subcutaneous cellular tissue in the seat of the discolourations, so as to blacken or redden the membranous partitions of the adipose cells, but that this last effusion is never extensive."

"It is impossible," continues Dr. Christison, "to fix absolutely the limit of the interval beyond which contusions cannot be imitated by violence applied to the dead body. It appears to vary with the state of the blood, and the time which elapses before the body cools and the joints stiffen. Sometimes the appearance of contusions can hardly be produced two hours after death; sometimes they may be slightly caused three hours and a quarter after it; but I should be inclined to think this period very near the extreme limit."

The testimony of Chaussier* corresponds with what has just been stated. "If," says he, "the injuries have been inflicted soon after death, whilst the muscles preserve their contractility, there will neither be tumefaction, nor infiltration of blood into the cellular tissue, or the blood will only form a clot without adhesion to the divided surfaces."

Lividities or livor, which are the terms employed to express the nature of discolourations occurring spontaneously after death, may be easily distinguished from ecchymoses, which are the result of injury during life. Livor is generally found on the back and thighs, or on the parts of the body on which it has remained when becoming cold. Sometimes it extends more particularly to the head or neck or genital organs. Lividities assume varieties of appearance, but they are confined to the skin, and are greatest when the blood has long retained its fluidity. Infiltration or effusion of blood into the cellular tissue never occurs from them, nor are they ever attended by tumour.

Ecchymosis or sugillation, on the contrary, is characterized by a true effusion of blood, which has formed a coagulum, and this coagulum is intimately adherent to the meshes of the cellular tissue, and frequently forms a tumour. In the progress of putrefaction, indeed, the blood resumes its fluidity, escapes from the vessels, and collecting under the skin forms soft fluctuating tumours, which, on being opened, are found to contain a dark sero-sanguineous fluid. But it would be impossible for any person of moderate information to confound such appearances with the phenomena of true ecchymosis.

Death from torrefaction or burning is of rare occurrence in criminal cases, yet we are informed by Dr. Ryan† that an instance of this crime has been recently perpetrated in London. The circumstances to be investigated by the medical jurist would be, whether the child was

* See Scott's Case of Infanticide. Edinb. Med. and Surg. Journal, vol. xxvi. p. 75.

† Ploucquet, Über die gewalt Yodesarten, 378.

‡ Dict. de Médecine, tom. xiii. p. 183.

§ Op. cit. tom. iv. p. 502.

|| Recueil de Mém. p. 470.

¶ Cases and Observations in Med. Jurisprudence. Edinb. Med. and Surg. Journal, No. xcix. p. 247.

* Recueil de Mémoires, p. 471.

† Manual of Med. Jurisprudence, p. 169.

killed by burning, or the body was thrown into the fire after death from other causes. Some late experiments of Professor Christon* show that "a line of redness near the burn not removable by pressure, and likewise the formation of blisters filled with serum, are certain signs of a burn inflicted during life." The application of a cauterizing iron ten minutes after death did not cause redness, although vesications were produced; which vesications, however, did not contain serum, but were dry and filled with air.

Instances of infanticide by drowning are infrequent. The proofs would be found in the signs of extra-uterine life, the absence of other efficient causes of death, and the presence of phenomena which are usually observed in asphyxia from submersion. (See ASPHYXIA.) We may observe that the presence in the bronchi of a portion of the fluid in which the body was found is no proof of death by submersion; for fluids will pass into the bifurcations of the bronchi if the body have been thrown into water after death. If, however, any of the fluid, and particularly any foreign matters contained in it, were found in the stomach, death from submersion would be unquestionable, as it could only have arrived there from deglutition. The indications of struggling which are sometimes met with in adults destroyed by drowning, could not be expected in a newly-born child under such circumstances.

Death from criminal injuries of the head are distinguishable by the fracture of one or more bones in situations which, neither in the course of natural parturition nor in the case of sudden expulsion, are liable to them. Ecchymoses and wounds almost always accompany them.

In injuries of the head from violent compression criminally applied, it is highly improbable that the marks could be confounded with those which sometimes, though very unfrequently, occur during labour. The unusual situation, severity, and complication of the injuries, with the indications of extra-uterine life, would, in the absence of the signs of difficult labour, dissipate all doubt as to their origin. We shall here detail the marks of difficult labour which are usually met with.

In a first labour, even when there is no unusual disproportion between the head of the child and pelvis of the mother, and the delivery has been accomplished with moderate celerity, we observe in the presenting part of the child a tumefaction of uncertain extent and size. On dissecting this tumefied part, a serous infiltration, sometimes with sanguineous engorgement, is found under the subcutaneous cellular texture, and which does not exist in other parts of the head.

In a woman who has borne several children, whose pelvis is large, and the os uteri soft and yielding, this impression is so slight as to be scarcely perceptible, especially if the child is small, and the delivery have been quick. On the contrary, when the head of the child is large, the bones firm, and the labour slow and

painful, so that the head have been delayed in the pelvis, the tumour is large, prominent, and unyielding. When cut into, we not only find a sero-sanguineous effusion into the subcutaneous cellular tissue, but the pericranium is detached and elevated by a collection of dark fluid blood, the bone is brownish, and the connecting membranes are more or less elongated. These changes are still greater when the superior aperture of the pelvis is narrowed by an unusual projection of the promontory of the sacrum. Then the head is deformed, elongated in its greater diameter, flattened in the transversal. Sometimes even a depression or fracture, longitudinal, angular, or starred, of one or both parietal bones, may occur. All these phenomena are distinguishable from those produced by accidental or criminal violence by the nature and position of the tumour, and of the other injuries which result from the unnatural projections of the pelvis. Such deformity of the pelvis is ascertainable at any period after delivery; and where the usual proportions between the head of the child and pelvis of the mother exist, the appearances above adverted to are never met with.

We here terminate all the remarks we have to offer on the causes of the death of a newly-born child,* and venture to state that the indications afforded by them will be found applicable to the solution of the difficulties which can be reasonably anticipated on trials for infanticide. Undoubtedly instances may occur in which it will not be possible to demonstrate the cause of death, but such is the case also in other varieties of homicide. In infanticide the victim is incapable of resistance, and hence some of the ordinary proofs of homicide may be absent; but the kind and degree of injury necessary for the destruction of the life of a child are very rarely nicely measured by the perpetrator of the crime; and the violence committed is most frequently such as to leave no doubt as to the cause of death, and to constitute, at the same time, the most indubitable evidence of extra-uterine life. It is unquestionable, however, that medical evidence on trials for infanticide has not influenced the decisions of juries in the same degree as on trials for other kinds of murder. By some this has been attributed to the doubtful and hesitating manner in which medical witnesses have generally delivered their testimony;† by others to the impression that the killing of a new-born child, when perpetrated under the impulse of injured honour and the fear of disgrace, should not be classed with the other varieties of murder. The latter question we shall not attempt to discuss; but as regards the former explanation, we unhesitatingly express our conviction that the anatomical, physiological, and pathological phenomena on which medical evidence is founded on these occasions are as susceptible of positive conclusion as any other facts within the sphere of medical investigation. Never-

* For the signs of death by poisoning and deleterious gases, see TOXICOLOGY.

† Edin. Med. and Surg. Jour., vol. xxvi.

* Edin. Med. and Surg. Jour., No. cvii, p. 323.

theless, we are not surprised that medical men should frequently be unprepared to deliver their testimony with clearness and decision in criminal trials. The facts and information connected with these subjects are rarely applicable in the discharge of the ordinary duties of medical practice; and general practitioners in active occupation have, therefore, no great inducement, and seldom sufficient leisure to devote to the literary and experimental researches which investigations in medical jurisprudence demand, whilst it is to this class of practitioners that reference is generally made in medico-legal proceedings. The custom which prevails in Germany and other northern countries of Europe of appointing a medical officer for each district, whose especial duty it is to investigate all cases which become the subject of juridical proceeding, seems worthy of imitation in this kingdom. The establishment of such an office creates individual responsibility, and ensures a due preparation for the faithful discharge of it; and the concentrated experience thus acquired has contributed to the exactness and extension of medico-legal knowledge. Under existing arrangements in this country, the infrequency with which individual practitioners are called on to act, constitutes perhaps the chief reason why this department of professional study has hitherto been comparatively neglected.

III. We next proceed to inquire into the proofs whether the suspected mother has been recently delivered.

As collateral evidence, it is advisable to ascertain whether the general symptoms of pregnancy have pre-existed. It is evident that no conclusive opinion can be formed in such a case, auscultation and the *ballotement* supplying the only positive evidence of pregnancy. But if the menses have been suddenly suppressed, the mammæ and abdomen have enlarged, and no other symptoms of disease than inappetence, irritability of the stomach, and dyspepsia have followed, it may be reasonably presumed that the woman has been pregnant.

The proofs of recent delivery are furnished by an aggregate collection of signs, which, separately considered, do not admit of positive inference. In a woman recently delivered, particularly of a first child, the following appearances are very generally met with: the face is rather pale, the eyes are sunken and surrounded with a dark circle; the pulse is rather quick, full, and undulating; the skin soft, with some heat and moisture, having a peculiar acid odour. The breasts are tumefied, distended, and painful, yielding on pressure or suction a fluid having the characteristic properties of milk; the belly is soft, and the skin is wrinkled and marked with short red or white lines passing in different directions, chiefly towards the umbilicus; a separation of the linea alba is perceptible, particularly towards the umbilicus. The uterus is felt above the pubis. There is a discharge from the vagina either of a red, greenish, or light colour, and of peculiar odour. The genital organs are more or less tumefied, and considerably dilated in their whole extent; the

fourchette is lacerated; the os uteri is soft and relaxed, so as easily to admit of the introduction of the fingers, and a discharge similar to what has been just mentioned flows from it.

There is no known disease which will produce the concurrence of signs now enumerated, whilst after parturition, and particularly after a first labour, they almost uniformly occur.*

But the discovery of such a series of symptoms will depend altogether upon the period of time at which the examination was made. Zacchæus long since observed that the proofs of delivery were uncertain after the tenth day.† After the fourth or fifth they become less distinct, gradually diminishing, and at the end of a fortnight are indecisive. The possible fallacies are the sudden cessation of dropsies; the expulsion of hydatids or moles. The Foreign Quarterly Journal of Medicine and Surgery contains a case of the sudden disappearance of dropsy, in which the water was discharged per vaginam by passing down the fallopian tubes. In Rust's Magazin ‡ a case is related of the discharge of a "mole" preceded by the general symptoms of pregnancy, and accompanied by flooding and other signs of parturition. The discharge of the menstuous fluid after long retention might simulate some of the symptoms of recent delivery, but many of them, and those the most decisive, would be absent in all such cases; whereas, after delivery, and particularly of a first child, almost all would be found to concur.

IV. Do the phenomena presented by the supposed mother and child establish the suspected relationship?

The solution of this question is almost always easily determined in cases of infanticide by moral evidence; and indeed it is by moral evidence alone that it can be positively settled. Medical testimony must be confined to shewing that there is an agreement of the phenomena presented by the child with the indications of delivery observable in the woman. The data thus derived can be of a general nature only, and are confined chiefly to a comparison of the state of conservation or decomposition in which the body of the child was found, with the presumed period of delivery.

If the inquiry were not instituted for some days after delivery, it would be necessary to take into consideration the circumstances capable of accelerating or retarding decomposition. For instance, putrefaction proceeds most rapidly when the atmosphere is humid and still, and the heat ranges between 60° and 80° Fahr. It proceeds most rapidly in parts of the body

* A curious application of the knowledge of the signs of recent delivery has been mentioned by Capuron, *Médecine Légale*, p. iii. A young woman simulated pregnancy, and pretended to have been delivered, in order to obtain from her lover the execution of a promise of marriage. The latter claimed the child, which could not, of course, be produced. A charge of infanticide was brought against the pretended mother, who was compelled to show that she had not been delivered. This was attested by the medical examiners.

† *Quæstiones Med. Legales*, lib. 7, quæst. 2.

‡ Vol. 21.

which have sustained injury either before or after death.

It is important to remark that in bodies plunged into privies, putrefaction does not commence so soon as when they are exposed to the air; but having begun, it proceeds more rapidly in such a situation. Decomposition is retarded by submersion in water, so that two or three weeks generally elapse before, in bodies so circumstanced, putrefaction commences.

Some remarks on post-mortem examination, and on the drawing up of medico-legal reports with reference to the present subject, would furnish practical information of value, and hence form an useful appendix to this essay. It already, however, occupies the limits which can be assigned to it in the Cyclopædia, and we content ourselves with referring the reader to the Thesis of Lecieux, where the points now adverted to will be found admirably exemplified.

(Robert Arrowsmith.)

INFECTION, *infectio*, (not classical,) *infectus*, and *inficere*, Lat.—The meaning of this word has been, and perhaps still is, unsettled. It will be employed in this article to signify the deleterious or offensive qualities which certain matters designated by the terms malaria, matter of contagion, emanations, and effluvia, communicate to the air and other inert bodies; and likewise the pernicious effects which some of these substances produce on the human constitution. This description comprises, if we mistake not, all the physical senses in which the word is usually employed. It will be observed that, according to one of them, it is to a certain extent synonymous with contagion, and it is likewise made so by the custom of the majority of the profession; a custom which is in a great measure owing, we believe, to the word *contagion* being destitute of the verbal form, whence the phrases *to infect* or *to be infected* become convenient modes of expression. A good deal of confusion has resulted from an attempt to discriminate between contagion and infection, when the latter term is employed to express the transmission of disease from man to man; and in the article **CONTAGION** we have expressed an opinion that in this case the words should be regarded as strictly synonymous; but it will be observed that infection possesses a wider sense than contagion, being applied to cases of contamination which are never designated by the latter word.

Deleterious qualities may be communicated to certain bodies either by matters known only by their effects on the human constitution, or by those which affect perceptibly the sense of smell. Of the former an account will be found in the article **CONTAGION**, and in those on **MALARIA** and **MIASMA**. The latter consist of hydrogen and its compound gases, carbonic acid, azote, and perhaps other gaseous matters which are the result of animal and vegetable putrefaction aided by the presence of moisture. Their sources are various, such as cemeteries in which bodies are deposited at an insufficient

depth from the surface, or from which it has been found necessary to remove the accumulated remains; slaughter-houses; dissecting-rooms; neglected privies and drains; stagnant waters, in which organic recrements are undergoing decomposition, as is often exemplified in noisome swamps, or at low water on the banks of rivers near their mouths, when in the vicinity of populous towns; human beings accumulated into a small space with deficient ventilation, &c.

The two genera of infecting substances frequently co-operate in producing an effect on the human system. Thus it is commonly observed that contagious diseases are more generally diffused and assume a worse character in an atmosphere abounding in manifest impurities than in one which is free from them. During the prevalence of typhus at Paris in 1814, the mortality was observed by M. Jadioux to be frightful in those wards of the Salpêtrière which are situated near the sewer of the hospital; and it was very easy indeed to multiply examples of this description.

The bodies which are sensibly contaminated by infecting particles are various, and differ much in their power of receiving and retaining the contamination. Confined masses of atmospheric air receive it readily and retain it long, as likewise do solid bodies which possess the property of holding air in a quiescent state within their interstices, such as cotton, wool, cloths fabricated from these substances, fur, feathers, &c. On the contrary, smooth and polished surfaces are tainted with difficulty, and are readily cleared of the pollution. These facts are illustrated by the well-known experiment of Mead, who placed a portion of carded cotton near a morsel of putrefying meat under an inverted bell-glass, and thus ascertained that the downy substance became strongly impregnated with the odour and retained it long, whilst the contrary was the case with the smooth surface of the glass. The same rule is observable with respect to certain infecting particles of which our senses are unconscious, for the downy substances named retain contagious matter long, and hence become powerful fomites; but there is no reason to think that that species of marsh effluvia called malaria adheres to them so as to render them the media by which it is communicated to the human system.

Action of infecting substances on the animal economy.—We now come to the second branch of our subject, the consideration of the mode in which infecting agents operate on the human constitution, and the kind of change which they produce there.

If common odorous infecting matters are freely diluted with atmospheric air, we find that persons do not suffer from exposure to them, as is exemplified in the case of butchers, tanners, &c.; but in a more concentrated state they produce very deleterious effects, and occasionally instant asphyxia, which was illustrated by the well-known case of the exhumations in the cemetery of the Innocents at Paris, and is not unfrequently exemplified in attempts to

empty privies which have been long neglected. The slower but yet pernicious effect of the same cause is shewn in the unhealthy aspect of the inhabitants of filthy and ill-ventilated alleys in large cities of which the police is neglected. Those agents whose existence is recognized only by their influence on the animal economy are likewise found to be affected by admixture with pure air. The effect of dilution is very conspicuous in the case of human effluvia, which have their intensity much diminished in a free and pure atmosphere. Marshy emanations retain considerable noxious power at a distance from their source, but there is a point beyond which they are inoperative, shewing that diffusion in the atmosphere is ultimately destructive of their agency.

There are two hypotheses regarding the mode in which these matters act injuriously on the economy. According to one their operation is on the nerves of the part to which they are applied; the other supposes them to be absorbed from the same part into the circulation. In the present state of our knowledge it is impossible to decide in favour of one or the other of these modes, or to say that either of them is that which is uniformly operative. The very rapid action of certain mephitic gases leads to the supposition that an impression on the nerves of the air-passages is sufficient for the production of *their* poisonous effect on the system. The cutaneous surface, the mucous membrane of the air-passages, and the corresponding surface of the alimentary canal, have each of them been supposed by different medical reasoners to be the channel by which noxious agents find access to our system. Lancisi, who first reasoned with any degree of accuracy on this subject, conceived that such agents might be transmitted by all these media to the interior; and we believe that he was correct in supposing that any of them might be the channel through which the system was contaminated. When the epidermis is entire, the absorbing power of the cutaneous surface is so very feeble, and its nerves are so protected by an inert covering, that it is probable that gaseous matters of a noxious nature rarely act in this way; but more concentrated substances often do so when the surface is broken, as in inoculation or injuries from dissection, which last certainly produce a species of infection. The first impression from infecting matter diffused in the atmosphere was supposed by the late Dr. Jackson to be made on the alimentary canal; and it is very probable, at least, that by the act of deglutition, which persons are almost incessantly performing to swallow their saliva, noxious particles may be conveyed thither; and whether we regard its mucous membrane as an absorbing or sentient surface, it is one through which such particles are very likely to act on the animal economy. But the most ready access for atmospheric poisons to the system is afforded by the air-passages. The experiments of Nysten and Edwards have proved that hydrogen, azote, and other gases, are rapidly absorbed by the lungs; and analogy would lead us to attribute a similar suscepti-

bility of absorption to contagious and other miasmata; whilst, if we reject the necessity of absorption, and assume that a nervous impression is all that is required, we find a widely extended and sensible membrane on which the deleterious corpuscles may operate.

The local operation of these poisons has been considered as far as our present knowledge of the subject admits. It remains that we should notice their more general effect, or their operation on the animal economy, if we are to take such a view, after they are absorbed into the circulating mass. To discuss the various changes which odorous infecting matters effect in the system—the modes in which they destroy life or impair its vigour, would lead to a very lengthened disquisition, and one which perhaps belongs rather to the physiologist than the practical physician. But the agency of the morbid poisons by which what is strictly called infection of the human constitution is produced, and diseases are engendered ranking among the most important of our nosologies, demands some notice in this place. To whatever parts of the body morbid animal poisons or marshy effluvia may be in the first instance applied, and however various the diseases ultimately engendered by them, we believe that their primary constitutional effect is on the nervous system. The period which generally intervenes between the application of a contagious or paludal poison and the full development of the disease engendered by it, is not one of health; and the slight signs of indisposition which exist are referable to the nervous system solely, excepting in a proportion of the cases arising from marsh effluvia, where some disorder of the bowels is after a time associated with the indications of nervous affection. These indications are extreme debility, inertness in motion, irritability and despondency of mind, incapacity of continued attention, noises in the ears, occasional giddiness, inappetency or morbid appetite, and extreme susceptibility of the impression of cold, the vascular system being during this period free from manifest disturbance. The first symptoms of the invasion of the actual disease partake of the same nervous character. They are giddiness of the head, pain there and along the spine, marks of irregular distribution of heat, rigors, inappetency, nausea, and in a proportion of the cases of some diseases, the exanthemata for instance, convulsions. One morbid poison, that of hydrophobia, appears to confine its whole operation to the nervous tissue, an extraordinarily erethismal state of this tissue giving rise to all the phenomena of the disease, and at its fatal close there being no traces of local affection of uniform occurrence or of such importance as to be considered as the source of the symptoms witnessed during life. In most diseases the vascular and other systems are ultimately involved, but accurate observation will always discover preceding indications of an affection of the sentient portion of the frame.

For the mode of purifying infected substances see DISINFECTION.

(Joseph Brown.)

INFLAMMATION, from *inflammo*, to burn; hence, also, phlogosis, phlegmasia, phlegmon, &c. from *φλέγω*: a name given on account of the resemblance of spontaneous inflammation to the effects of the application of fire to the living body.

There has hitherto existed so much diversity of opinion respecting the proximate cause or nature of inflammation, and it is a disease assuming such an infinite variety of forms, that it is scarcely possible to give a strictly correct and scientific definition of it. The following, proposed by Peter Frank, is the most comprehensive and accurate which has hitherto appeared:—"Calor partis, tensio, moles, ac durities acuta; ut plurimum cum sensu doloris fixi, nunc ardentis, nunc pungentis, pulsantis, nunc gravati, aliquando nullæ, cum colore vivido, nunc profundius rubro; sæpissime cum febre, pulsu frequenter pleno, forti ac duro, sæpe contracto ac parvo, aliquando naturali; ac tumoris evidenti, aut in suppurationem, aut in gangrenam nisu, dicitur inflammatio." P. Frank, however, judiciously adds that the presence of all these signs is not necessary to constitute inflammation, and that frequently some of them are wanting.

So large a proportion of the diseases which affect the human frame are of an inflammatory nature, that the study of the pathology and treatment of inflammation has at all times been considered a subject of interest and importance. The opinions entertained by professional men at different periods on this branch of medical science have necessarily varied with the prevalent theories of the day. The writings of the older authors abound with speculations, more or less ingenious, respecting the nature, causes, and treatment of inflammatory affections; and although they do not supply much information founded on the sober and rigid deductions of experimental philosophy, a brief review of the theories of inflammation may prove both interesting and useful, as an occasional ray of light sometimes glimmers forth in the midst of much obscurity, and the errors into which those who have indulged in visionary conjectures have fallen, may serve as beacons to protect us from a similar danger.

The general principles respecting the nature of diseases, promulgated by Hippocrates, exercised a considerable sway over medical science for above two thousand years, holding a more or less prominent station in the systems of almost every sect down to the close of the last century. These views laid the foundation of the Humoral Pathology, in which the first material innovation, and especially in the theory of inflammation, was made by Paracelsus in the fifteenth century, who, having bestowed considerable attention on the study of chemistry, endeavoured to account for all diseases by changes in the chemical composition of the animal fluids. This gave origin to the sect of *chemical physicians*, who violently opposed the doctrines of the school of Hippocrates and Galen. There was a strong tendency in the physiologists of that period to ascribe exclusively the phenomena of life to the influence of the same

laws as those which regulate the motions of inanimate matter; and some, conceiving they could satisfactorily explain all the operations of the animal economy on the principles of mechanics, founded a sect of *mechanical physicians*.

The ignorance which had hitherto prevailed respecting the circulation of the blood contributed no doubt very materially to prevent the introduction of more correct views of pathology: it was very generally believed that the liver was the centre of the vascular system, from which the blood went forth by day to the extremities, returning again by night; if any peccant matter irritated the liver, the blood was sent out more forcibly; and if, at the same time, any part of the body were either weakened or irritated, a swelling was produced by the flow of humours to this place: fluxions might therefore happen either from weakness or irritation; the peculiar nature of the swelling was supposed to be modified also by the nature of the humour: blood produced the true phlegmon, bile being the supposed cause of erysipelas, &c. The blood and humours were imagined sometimes to stagnate in a part from want of expulsive power, and this was termed congestion; whilst fluxion or defluxion denoted a sudden flow of humours from a distant part.

The discovery of the circulation of the blood by Harvey in the beginning of the sixteenth century, was not followed by such an immediate improvement in the theory of inflammation or of other diseases as might perhaps have been expected. Although the course of the blood in the large vessels, and the connection between the lymphatic and sanguiferous systems through the medium of the receptaculum chyli and thoracic duct, were facts clearly ascertained, the functions of the capillary circulation and of the nervous system, which are more immediately connected with the proximate causes of inflammatory affections, were yet very little understood.

Böerhaave, one of Stahl's contemporaries, a professed eclectic, endeavoured to select whatever appeared most valuable in all preceding systems, and to combine the whole into a uniform body of medical science. He took the humoral pathology as the basis of his theory of disease, and especially of inflammation, but adopted also many of the opinions of the chemical and mechanical sects. He considered that the blood and humours were vitiated in disease either by an excess of acid or of alkali, or by becoming too viscid and glutinous, or too thin and watery; that the circulation of the fluids might be too rapid or too slow; that the fibres of the solids were either too feeble and relaxed, or too rigid and elastic; that there were also separate diseases of the large vessels and of the capillary system.

The following summary will afford a connected view of the fanciful speculations of the different sects whose opinions we have thus briefly noticed. The propelling force of the heart having been ascertained, and microscopic observations having been made on the capillary

vessels, and on the size of the globules which pass through them, the mechanical physicians imagined they could satisfactorily explain many of the phenomena of disease by the effects of friction, pressure, and trituration, and by the relative dimensions of the vessels and of the globules which they circulate: these globules were described by Leeuwenhoek as conical; so that, when forced into very small vessels, they became fixed like a wedge. The combinations and decompositions of the chemists added to the preceding theory that of the acrid and inflamed, the inspissated, fermented, or putrid state of the humours. They were thus heated by the excess of friction, of motion, or of pressure, or rendered acrid, irritating, and inflammatory by an excess of acid; they distended the vessels by their rarefaction, were condensed by evaporation, becoming then corrupt and dissolved; or when too viscid and inspissated, they stagnated in the vessels, which were too feeble to expel them, and became cold and concrete, until some strong reaction took place by which the crude morbid humour was concocted, and the tumefaction resolved either by the formation of pus or the elimination of the concocted humour through some of the excretory organs. At other times, the solids being too lax and weak for the perfect elaboration of the fluids of nutrition, became corrupted and dissolved, acquired an excess of alkali, and gave origin to putrid diseases. Their treatment was adapted to these views of the nature and causes of diseases, and we consequently find in their therapeutics refrigerant remedies, delayants, inspissants, antiseptics, solvents, depuratives: and some slight share of influence in the production of disease being allowed to the solids, there were also remedies intended to increase the tone and cohesion of the fibres; others to relax and lessen rigidity, and others to allay excessive sensibility.*

The contending sects of chemical and mechanical pathologists were completely overthrown in the beginning of the seventeenth century by the opinions of the celebrated Stahl. Having noticed that the changes which the components of the body undergo during life, differ greatly from those that take place after death, he conceived, like Hippocrates, that there must necessarily exist some additional principle during life by which the action of the mere physical laws is counteracted and modified, and from which the body thus derives its distinctive character of vitality. He imagined this agent, which he called *anima*, to be something distinct from the body, possessing a species of intelligence which enabled it to act the part of a rational being, and to superintend all the operations of the animal economy. There is an apparent analogy between the *anima* of Stahl, and the *ψῆσις* of Hippocrates: the latter, however, only proposes his term as a rational manner of explaining the facts he observed, whilst the former considers his principle as an

abstract metaphysical spirit, capable of acting independently of the state of the body, and without any physical necessity arising from that state. In other respects Stahl adopted most of the opinions of Hippocrates, and engrafting on them some of the doctrines of the chemical school, his pathology turned chiefly upon the opposite states of plethora and cacochymy.

Van Helmont, one of the most distinguished of the Vitalists, proposed a more rational theory of inflammation than any of his predecessors. According to him there were two circumstances indispensable to the development of inflammation—the action of a stimulus on parts endowed with sensibility, and an increased activity of the arterial system, followed by redness, pain, heat, and swelling in the part thus stimulated. He not inaptly compared the action of the stimulus to that of a thorn thrust into living flesh: this excited the alarm of his *archæus*, who immediately caused an increased flow of blood to the part, and set up a defensive and reparatory process. He adopted also many of the chemical opinions, conceiving his ideal inflammatory thorn to be generally acid, &c.

The humoral pathology, after keeping for a long period almost exclusive possession of the medical schools, began to receive a serious check from the doctrines taught at the University of Halle by Hoffmann; who contended strongly against the long-established notion that a vitiated state of the fluids was the primary cause of the great majority of diseases, and maintained that it was much more rational to attribute their various phenomena to morbid conditions of the solids, by which the fluids themselves were contained, elaborated, and kept in constant motion. There were, according to him, two principal morbid states of the solids, *spasm* and *atony*; and as the motions of the solids seemed to depend in a great measure on the influence of the nerves, he ultimately referred most diseases to affections of the nervous system: he attributed to the nervous principle the functions which Stahl ascribed to his *anima*, and Hippocrates to his *ψῆσις*. These views of disease were zealously embraced by Baglivi in Italy, Barthez at Montpellier, and Cullen in our own country: the latter applying them with great talent and ingenuity, as will be seen presently, to the theory of inflammation. The humoral pathology soon became completely exploded, and a totally opposite system was substituted in its place, called that of the *Solidists*. The introduction of this system was greatly favoured by the labours of the celebrated Haller, whose important discoveries in anatomy and physiology have contributed so much to our knowledge of the intimate structure and functions of the different organs, and particularly of the nervous system.

Dr. John Brown of Edinburgh, adopting some of the opinions of the Solidists, founded on them a most fanciful system of physiology and pathology, which, although less noticed in this country, was eagerly adopted in France and Italy, and partially also in Germany, and had a most baneful effect over the practice of medicine in these countries. According to Dr. Brown,

* For a full account of all the leading medical theories, see Broussais' *Histoire des Doctrines Médicales*.

life is only sustained by the action of either external or internal stimuli on the body through the medium of the nervous system : this susceptibility of impression he calls *excitability*. If the action of stimulants be too much increased, this gives rise to diseases with excess of action (*sthenic*), and, when deficient, to diseases of debility (*asthenic*.) Asthenia is subdivided into *indirect*, when the excitability is exhausted by excessive excitement, and into *direct* when the deficiency of excitability arises from a want of adequate stimulus. Dr. Brown attended more to the state of the general excitability than to the condition of the organs ; there were thus two deviations of the excitability from the standard of health, constituting the *sthenic* and *asthenic* diatheses, and only two great classes of diseases : he maintained, moreover, that both sthenia and asthenia could never exist together in the same individual ; so that, if an individual presenting signs of general debility was seized with pneumonia or hepatitis, the local affection, however severe, was attributed to debility, and treated by stimulants : inflammations were thus divided into two classes, the *sthenic* and *asthenic* ; and idiopathic fevers, hemorrhages, congestions, convulsions, plethora, &c. were classed among the diseases of debility. He asserted that the diseases of direct and indirect debility so greatly preponderate over those of the opposite class, that out of every hundred cases there were scarcely three of genuine inflammation : there were accordingly only two classes of remedies, and these pernicious principles necessarily led to a most incendiary system of practice. The apparent simplicity and plausibility of this theory unfortunately obtained for it numerous adherents.

The Italians, after adopting Brown's theory, discovered at last its fundamental errors, and engrafted on some of his physiological principles a new system called the *contro-stimulant* : they admit two opposite diatheses, one of *stimulus* and one of *counter-stimulus*, and have founded a third class of diseases consisting of local irritations, which may give rise to either of the two preceding morbid states of the constitution : they accordingly adopt only two classes of remedies, the stimulants and counter-stimulants ; the latter being supposed to remove directly, and without even any evacuation, the excess of stimulus in the system, whilst stimulants act in a manner directly the reverse : the animal fibre, it is also supposed, will tolerate the action of stimulants or counter-stimulants exactly in proportion to the strength of the existing diathesis, either of stimulus or counter-stimulus. Venesection is, however, considered as an active counter-stimulant. Counter-stimulant remedies include above nine-tenths of the *Materia Medica* ; we have thus tartar-emetic, bark, mercurial and saline purgatives, preparations of iron, all kinds of bitters, &c. classed together as suited to combat inflammation. The really stimulating remedies are limited to a very small number, such as opium, fermented liquors, &c.

Several distinguished physicians introduced about this period the more practical and judicious method of investigating carefully the

symptoms, course, varieties, and post-mortem appearances of diseases. A number of highly valuable monographs of disease were the result of this course of proceeding. Among these we must first mention, as particularly deserving of notice, the works of the great Sydenham. He was the foremost to perceive the necessity of descending from the engaging but profitless regions of fanciful speculation, to the more laborious task of a rigid and accurate observation of the phenomena of nature ; and his example had a powerful influence in giving a new and better direction to the investigations of medical science throughout Europe. Many excellent descriptions of the inflammatory affections of separate organs, and of the alterations of structure which they induce, are also to be found dispersed throughout the writings of Grant, Stoll, De Haen, Morgagni, Bonetus, Wagler, Røederer, &c. Bordeu, in his work on chronic diseases, gives a very minute and faithful account of the irritative and inflammatory affections of the digestive tube, and lays considerable stress on the sympathetic influence exercised by the abdominal viscera over every other part of the animal economy.

Inflammatory diseases had not, however, hitherto formed the subject of any special and separate inquiry ; and the merit of having contributed the first scientific work on this important class of diseases belongs to our talented countryman Dr. Carmichael Smith, who in 1788 published an admirable paper on this subject,* in which he took a comprehensive view of the peculiarities of inflammation as they are observed in the principal elementary tissues that enter into the composition of the body : this was laying the foundation of the morbid anatomy of tissues, from the cultivation of which medical science has since derived such incalculable advantage.

The next separate treatise on inflammatory diseases was one on chronic inflammations by M. Pujol, of Castres in Languedoc, which obtained a premium from the Royal Academy of Medicine of Paris in 1791 : in this valuable work the author first considers the chronic inflammatory affections of the surface of the body, and next those in succession of the three splanchnic cavities.

The preceding writers had confined themselves to a general description of the different varieties presented by inflammatory diseases, and of the changes of structure they induce. The celebrated John Hunter instituted an experimental inquiry into the essential nature and proximate cause of the process of inflammation, an undertaking for which he was particularly well qualified by his admirable knowledge of the minute anatomy of tissues ; and his great work on the *blood, inflammation, and gun-shot wounds*, appeared in 1794 : this was the first experimental and scientific treatise on the theory of inflammation ever published ;†

* Medical Commentaries, vol. ii.

† A small treatise was published at Florence by Dr. Vacca in 1765, entitled *Liber Inflammationis morbosæ quæ in humano corpore fit, natura, causis,*

it is distinguished for depth and accuracy of observation, acuteness of reasoning, and original and enlarged views of the laws which regulate the functions of life, and must ever be considered as a lasting monument of the author's genius. We shall frequently have occasion to refer to it in the course of this article.

The modifications occasioned in disease by the structure of the part affected, were beginning to excite more general attention, as appears by the writings of Dr. William Hunter, John Hunter, the two Monros, and Dr. Cullen, as well as by the splendid collections of pathological preparations made by the four former. M. Pinel, sensible of the many advantages that might be derived from a more comprehensive study of the influence of texture in modifying disease, made this the ground-work of his valuable *Nosographie Philosophique*, which was first published in 1797. Although some imperfections must necessarily attach to every nosological arrangement in the present state of medical science, the plan followed by this distinguished pathologist was infinitely superior to that of any of his predecessors, and had a highly favourable influence on the medical opinions of the time. The phlegmasiæ constitute the second class of the *Nosographie Philosophique*, and are divided into five orders, founded on the five principal animal tissues—inflammations of the cutaneous tissue; of mucous membranes; of serous membranes; of the cellular tissue and parenchymatous texture of organs; of the muscular, fibrous, and synovial tissues: this is exactly the division that had been adopted several years before by Dr. Carmichael Smith.

It was the *Nosographie Philosophique* that suggested to Bichat the plan of his great work on the anatomy of tissues. This justly celebrated work may be considered as having laid the foundation of the improvements made in France in every department of anatomical and physiological science, since the beginning of the present century: it is only necessary to refer in proof of this to the labours of Laennec, Bayle, Majendie, Broussais, Andral, Louis, Lallemand, Rostan, &c.; and as relating more exclusively to the subject of the present paper, to the *Histoire Anatomique des Inflammations* of M. Gendrin, by far the most comprehensive and practical work that has yet appeared on inflammation; and to another valuable work, entitled *Recherches Experimentales sur l'Inflammation*, by M. G. Kaltenbrunner, published in the *Répertoire Général d'Anatomie et de Physiologie Pathologique*.

The cultivation of physiology and pathology has, during the same period, been pursued with great success in our own country. Among the many contributions to general or special pathology, may be mentioned those of Baillie, Thomson, Hunter, Philip, Hastings, M. Hall, Abernethy, Astley Cooper, Lawrence, Travers, Parry, Cheyne, Bright, James, Elliotson, &c.

effectibus, et curatione; but although containing some excellent observations, the work was chiefly speculative.

Before concluding this brief historical sketch, we must notice the views respecting febrile and inflammatory diseases promulgated a few years since by Broussais, and very generally adopted in France. Although carried beyond their just and reasonable limits, Broussais' opinions have been the means of introducing a highly beneficial change in the system of practice of that country, by exploding Dr. Brown's phlogistic method of treating diseases which was previously in almost general use.

Whilst Brown committed the great error of referring most diseases to a morbid state of the general excitability, overlooking in a great measure the constitutional effects of local diseases, Broussais, influenced probably by his more extensive acquaintance with pathological anatomy, founded his system of *Physiological Medicine* on the principle that all diseases affecting the general health have a local origin. Instead, also, of considering a morbid condition of the nervous system to be the proximate cause of all diseases, and the great majority of them as the effect of debility, he maintains that they depend much more generally on affections of the vascular system; that they originate in various degrees of irritation, congestion, and inflammation in some one organ, disturbing by morbid sympathy the functions of all the others; and that the great majority of diseases are, in fact, of an inflammatory nature. Local irritations and morbid sympathies constitute thus the fundamental principles of Broussais' system; many debilitating agents, he conceives, excite inflammation, and the deficient action of one organ may excite a sympathetic irritation in others. To the affections of the mucous membrane of the alimentary canal he attributes an inordinate degree of importance, more particularly the sympathy of the digestive with the other vital organs. He asserts that fever is always the effect of an irritation of the heart, either primitive or sympathetic: that every form both of continued and intermittent fever has for its primary cause inflammation of the mucous membrane of the stomach and bowels, which he terms *gastro-enterite*; he completely repudiates the notion of there being any such diseases as idiopathic or essential fevers, maintaining that they are all to be explained exactly on the same principles as the symptomatic fever of pneumonia: all the exanthemata, hepatitis, pyrosis, and a vast number of other diseases, are, according to him, complicated with gastro-enterite; and we heard him even boldly assert in his lectures, that hydrophobia was only a gastro-enterite, frequently complicated with some degree of inflammation in the pharynx and brain!—a most remarkable instance of the dangerous extent to which the distortion of facts may be carried by an immoderate love of theory. An exposition of the fallacy of Broussais' opinions respecting fever will be found in the introduction to the article FEVER.

In writing upon a branch of pathology which has been the subject of so much investigation as inflammation, we cannot avoid re-

peating a great deal that has often been previously stated by others: as a reference to authorities on all points respecting which there can be no difference of opinion would be endless and inconvenient, we think it preferable to state here generally, that the sources from which we have chiefly derived assistance in the composition of this article, are the works of John Hunter, Thomson, Travers, Craigie, Elliotson, Andral, Gendrin, and Kaltenbrunner. Whenever we have occasion to mention opinions which possess any degree of novelty or originality, we shall either quote the author or refer to his work.

Physiological and pathological considerations on the circulation.—There are three of the elementary parts of the body that appear to be primarily and more essentially affected in inflammation: these are the bloodvessels, the nerves, and the blood. As every rational theory of disease must be founded on a correct view of the healthy phenomena of life, we shall offer a few observations on the action of each of these parts in the living body, before proceeding to the details of the theory of inflammation.

The minute ramifications of the arteries and veins, and the capillary system of vessels, being the principal seat of the morbid phenomena of inflammation, it is important, therefore, to attend to the peculiarities of the circulation in these vessels. It is now generally admitted that the arterial branches acquire a greater power of contractility in proportion as they become smaller, and that the arterial trunks are less contractile and more elastic. That the minute ramifications of arteries are endowed with a high degree of contractility, in virtue of which they are enabled to carry on the circulation independent of the action of the heart, is proved by a variety of circumstances. It is by this order of vessels that the functions of nutrition and secretion are performed, and it is absolutely necessary for the uniform and uninterrupted accomplishment of these varied and highly important functions, that they should have the power of controlling the motions of the fluid circulating within them. The relative momentum of the blood in different parts of the body, or the quantity of the blood and its velocity, are perpetually varying from the influence of external stimuli or internal causes; and this variable state of the momentum of different portions of the arterial system is a decisive proof of the vital contractility of its vessels. We thus observe the minute vessels of the cheek, in the act of blushing, acquiring increased activity and admitting more blood; while under the influence of depressing passions, such as fear, they are suddenly emptied, and the countenance becomes pale. Local inflammation is stated by all pathological writers to be characterized by a rapid throbbing pulsation of the vessels in the part affected, while the action of the heart and arteries of other parts of the body is not increased. If a person having inflammation in one hand be bled in both arms at the same time, twice or thrice as much blood will flow from the

diseased side as from the other. It is partly by the contractility of the extreme vessels in animals which have no heart, that the fluids in the lymphatics and lacteals are absorbed and moved. The minute arteries, like muscular tissues, retain the power of contracting after breathing has ceased; this is the cause of the empty state of the arterial system after death, for the small arteries and capillaries continuing to contract, empty their blood into the veins, while they receive no fresh blood from the heart. When death is rapidly occasioned by lightning or any violent narcotic poison, the action of the arterial and whole muscular system being suddenly destroyed, the arteries are found filled with blood as well as the veins.

The preceding facts respecting the active and independent power of the small arteries and capillaries over the circulation of the blood, have been strongly confirmed by the interesting microscopic observations of Dr. Thomson, Dr. Wilson Philip, and Dr. Hastings, for an account of which we must refer the reader to the writings of these distinguished physiologists.

It is, in the mean time, evidently impossible not to admit that the action of the heart and large arterial trunks, or *vis a tergo*, must assist in carrying on the capillary circulation. A constant supply of fresh blood is transmitted by each contraction of the heart, which must have the effect of distending and stimulating the action of the smaller vessels. When the contractions of the heart are unusually violent and rapid, the blood will no doubt be propelled through the small vessels, and especially through those within its vicinity, with a degree of force that will completely overcome the contractility of these vessels, and give them the appearance of passive canals; but this circumstance does not appear to us by any means sufficient to prove that under a quiet state of the circulation, and especially in parts of the body remote from the heart, the extreme vessels and capillaries have no controul over the course of the blood: the reverse of this has, in our opinion, been satisfactorily established by the facts and experiments already adduced. We conceive, therefore, that it is more reasonable to admit the influence of both causes in the circulation of the extreme vessels, and that the advocates on each side of the question have been much too exclusive.

The preceding are highly important facts, which will require to be taken into consideration in investigating the nature of inflammation. It should also be stated, that according to the latest experiments, it would appear that the arteries do not terminate in exhalents, but that both exhalation and absorption take place through the pores of the thin coats of the vessels.*

While we consider the independent vitality of the minute arteries as the most efficient agent by which they carry on the circulation, it is but reasonable to admit that the laws of

* Majendie's Physiology, p. 353, 479, (Dr. Milligan's translation.)

capillary attraction may afford some degree of assistance; for the living body is never completely exempt from the influence of physical laws. Dr. Marshall Hall has lately made some interesting microscopic observations on the action of the capillary vessels. He describes them as a network of pellucid vessels, differing from the small arteries in the circumstance that they subdivide without becoming smaller, and freely anastomise with each other, like nervous plexuses, forming thus an intermediate system of vessels between the arterial and venous systems. He states several reasons for inclining to the opinion that they are rather passive than active canals, through which the blood is circulated by the impulse of the arteries, the absorbing action of the veins, and also by capillary attraction. The facts brought forward in support of this opinion do not, however, appear to us sufficiently conclusive to controvert the numerous proofs we have already mentioned in support of the opposite opinion, and we consider it, therefore, a subject requiring further investigation. Dr. Marshall Hall fully admits the contractility of the small arteries.*

Dr. Reuss of Moscow published, some years ago, an account of experiments tending to shew that galvanism exercises a locomotive effect on the circulating fluids. This singular property has been more fully investigated of late by M. Dutrochet,† who has made some very interesting discoveries respecting the circulation of fluids, and has applied them with considerable ingenuity to the functions of vegetable life. M. Dutrochet has ascertained that when two fluids of different densities are only separated by a thin bladder, they exercise a double power of attraction over each other, which leads to the formation of two currents passing through the bladder in opposite directions and of different strength: the necessary result is a greater accumulation of fluid on one side of the bladder, in the direction of the strongest current, and a diminution of fluid on the other side. He conceives this property to depend on differences of density, of chemical composition, and of states of electricity. He has demonstrated the existence of a double current of this description through the vesicular texture of vegetables, and he calls the introduction of fluids into the vesicles *endosmosis*, and their expulsion *exosmosis*. He endeavours to account in this way for the ascent and descent of the sap, and for the circumstance of the roots of plants taking always a direction downwards, and the stems a direction upwards. This property is shewn to differ from capillary attraction. May not *endosmosis* and *exosmosis* be reasonably supposed to have some influence over the circulation in the extreme vessels in animals as well as in vegetables? This has already been made the subject of some highly interesting experiments by Mr. Faust‡ and Dr.

Mitchell* in America, and Dr. Stevens† in our own country. These gentlemen have clearly proved that gases are subject to the singular laws of *endosmosis* and *exosmosis* as well as fluids, and they have deduced from the facts they have observed a completely new and very ingenious theory of the function of respiration.

The connection and mutual influence of the two great systems, the vascular and nervous, on which mainly depend the functions of life in the higher classes of animals, has often been an interesting subject of inquiry with physiologists, and is one that involves considerations of the highest importance also to the pathologist. It may be necessary to premise that there are two great divisions of the nervous system, the first including the cerebro-spinal organs and their nerves, and the second the ganglionic system of the great sympathetic; and that the vascular system may be also divided into two sections—the circulation of the heart and large vessels, and that of the smaller and extreme vessels.

The heart and larger vessels receive but few nerves directly from the cerebro-spinal portion of the nervous system, their nerves being principally supplied by the ganglionic system of the great sympathetic, which appears to have the organic or nutritive functions of life more especially under its influence. The two divisions of the nervous system are, however, intimately connected by the numerous branches the great sympathetic receives from the spinal marrow, and by a few smaller branches coming from the brain.

There has been much difference of opinion among physiologists respecting the degree of influence exercised by the brain and spinal marrow over the organs of circulation; some concluding from their experiments that the action of the heart and bloodvessels is wholly independent of this portion of the nervous system; while others adopt, as the result also of experiments, a directly opposite opinion. The medium between these contradictory views approaches probably the nearest to truth; and the following facts may, we think, be considered as satisfactorily established by the joint testimony of experiment and pathological observation.‡ The action of the heart and large vessels is not immediately dependent on the influence of the cerebro-spinal nerves, for these organs continue to carry on the circulation after the brain and spinal marrow have been completely destroyed; they preserve, however, this independent power only for a short time, as their contractions

mose and Exosmose of Gases, and the Relation of these Phenomena with the Function of Respiration. —American Journal of Medical Sciences, vol. vii. Philad. Nov. 1830.

* On the Penetrativeness of Fluids.—American Journal of Medical Sciences, vol. vii.

† Observations on the Healthy and Diseased Properties of the Blood.

‡ This is the conclusion Dr. Marshall Hall has adopted after repeating the experiments. An account of the whole controversy will be found in his valuable little treatise on the Circulation of the Blood.

* On the Circulation of the Blood, by Marshall Hall, M.D. &c.

† Nouvelles recherches sur l'Endosmose et l'Exosmose, &c. par M. Dutrochet, 1828.

‡ Experiments and Observations on the Endosmosis and Exosmosis of Gases, and the Relation of these Phenomena with the Function of Respiration. —American Journal of Medical Sciences, vol. vii. Philad. Nov. 1830.

gradually become weaker, and completely stop at the end of a few hours. It is evident, therefore, that the functions of these organs, although partially removed from the direct influence of the brain and spinal marrow, cannot be continued in full vigour and activity after the destruction of this important portion of the nervous system. We see, likewise, these positions clearly illustrated by the natural phenomena both of health and disease. The action of the heart is not perceptibly affected by the ordinary operations of the mind, while it is frequently either quickened, depressed, or totally suspended, on the occurrence of sudden and powerful emotions; the functions of the heart are also not disturbed by partial diseases of the brain or spinal marrow, but very extensive lesions of these organs lead inevitably to some alteration in the state of the circulation.

The circulation in the extreme vessels (arteries, capillaries, and veins) is also in a great measure independent of the direct influence of the cerebro-spinal portion of the nervous system, for when the communication of a part of the body with the brain and spinal marrow has been destroyed, as, for instance, in paralysis, the function of nutrition is still carried on, although with diminished activity. The blood-vessels are chiefly supplied with nerves from the great sympathetic; the nervous filaments follow the ramifications of the arteries, subdividing most minutely around them, forming plexuses and penetrating their coats; the nerves of the cerebro-spinal system are also largely distributed, along with the bloodvessels, throughout the texture of many organs, conveying additional stimulus, although, as just stated, not absolutely indispensable to the action of the vessels. It may therefore be truly said, that wherever there are bloodvessels there are also nerves, and that there is scarcely a particle of organized animal matter without nervous tissue.

It is not, therefore, surprising that the varied and important functions of the extreme vessels should be under the immediate and powerful influence of the nervous system, and more especially of the ganglionic nerves of the great sympathetic. This is rendered obvious by innumerable facts both in physiology and pathology. The activity of the circulation in these vessels, and the various changes which the circulating fluid undergoes in the process of nutrition, secretion, &c., are, it is well known, accelerated, retarded, or otherwise altered, according to various modifications of sensibility. A striking proof of the important offices performed by the nervous system in these functions is also afforded by the result of Dr. Wilson Philip's experiments on the influence of galvanism over the function of secretion.*

Some physiologists have conceived that the nervous system has even a direct influence on the blood in the extreme vessels, an opinion which Andral is inclined to favour, as will be seen by the following extract from his patho-

logical anatomy:—"Barthez has said a great deal about a direct influence exercised by the nervous system over the blood: I grant that such an idea seems unfounded if we consider the blood only as it is in its great vessels; but in the capillaries, where it comes in contact with the solids and is confounded with them, where it manifests signs of vitality, and where in conjunction with the nerves it gives life to the organs it traverses;—in these, I say, who will venture to deny the influence of the nerves over it? In the capillaries is exerted in full force that law of mutual dependence that connects all the parts of the system, and makes of so many different elements but a single whole, of so many partial lives a single life. In them the nerves must act on the blood, as the blood acts on the nerves."^{*}

It should be remembered, on the other hand, that the nervous system is immediately dependent on the stimulus of blood for the preservation of its power, for this is completely destroyed the moment the nervous centres are deprived of arterial blood: there is, therefore, no fact in physiology better established than that of the intimate connection and mutual influence on each other of the vascular and nervous systems. They are the two that are first developed in the embryo, and they fulfil the most important offices in all the phenomena of life. These considerations are of considerable importance to the investigation of disease, as it will be seen that the various morbid conditions of the sensibility constitute one of the essential features of the process of inflammation.

We have next to consider the properties and uses of the blood. The ancients were so little acquainted with the structure and formation of the body, that perceiving the secretions and excretions generally vitiated in disease, they naturally considered the morbid conditions of the blood and other animal fluids as the primary and exclusive source of all diseases. After the humoral pathology had prevailed for many centuries, the rapid progress made in the science of anatomy and physiology about the time of Haller led pathologists into the opposite extreme of referring exclusively all the phenomena of life, both in health and disease, to the action and various conditions of the solids; the humoral pathology became then completely exploded by the speculations of the solidists. A more careful and impartial investigation, however, of the properties and uses of the various constituent parts of the animal economy in modern times, has been followed by the adoption of more comprehensive views of the operations of life; and it is now satisfactorily proved that the animal fluids, and particularly the blood, exercise an influence fully equal, if not superior, to that of the solids. In consequence of the imperfect state of animal chemistry, no very satisfactory results have yet been obtained from the analysis of the blood in disease. There can be no doubt, however, from numerous recent observations,

* Wilson Philip on the Vital Functions, c. v. p. 119.

* Andral, Pathological Anatomy, p. 660.

that it presents in many diseases a variety of remarkable changes in its physical characters: we must refer the reader for an account of these to the article *BLOOD, MORBID STATES OF THE*. Various alterations have also been discovered both in the chemical composition and physical properties of the other animal fluids as the effect of disease, and the *HUMORAL PATHOLOGY* is beginning to obtain, once more, the degree of attention to which, within rational limits, it is unquestionably entitled.

The blood has at all times been considered the chief support of life, and on this account, according to many, the seat of the vital principle. This is an opinion recorded in the most ancient books. We find in the Old Testament the following remarkable declarations of the inspired writers on this interesting point: "But flesh with the life thereof, which is the blood thereof, shall ye not eat."* "For the life of the flesh is in the blood." "For it is the life of all flesh; the blood of it is for the life thereof; therefore I said unto the children of Israel, Ye shall eat the blood of no manner of flesh, for the life of all flesh is the blood thereof."†

This opinion was embraced by Harvey, and in modern times has been warmly advocated by John Hunter. He considered, like some of the ancients, the principle of life to be a kind of distinct agent, independent of the conditions of matter, and endowed as it were with consciousness; he believed, however, "this principle to reside chiefly in the blood, and made a great many ingenious experiments tending to support this opinion. Hunter's arguments in favour of the independent vitality of the blood were its property of spontaneous coagulation and of assuming under certain circumstances the most complete organization. When blood is drawn from the vessels, the globules, which consist of pure fibrine, are attracted together and disposed to arrange themselves in lines or fibres, constituting the crassamentum. This fibrous arrangement bears a great analogy to the fibres of muscles, which consist also chiefly of fibrine.‡ Many causes of sudden death, such as lightning, the bites of venomous animals, some acrid and narcotic poisons, by which the nervous action is suddenly paralysed, have also the remarkable effect of suddenly changing the composition of the blood, preventing its coagulation, and rendering it incapable of supporting life. Under similar circumstances the muscles are also found relaxed and incapable of being excited by the

accustomed stimuli. These facts have been supposed by Hunter to prove an identity between the property of muscular contraction and that of the coagulation of the fibrine:* this idea seems to be further supported by the circumstance of the chemical composition of the fibrine and of muscle being nearly the same.

There have been many speculations on the cause of the spontaneous coagulation of the blood, some ascribing it to its death, and others, like Hunter, to its life, whilst some have attributed it to the escape of carbonic acid gas. The remarkable property of spontaneous organization which has been so frequently observed in coagula of blood seems directly opposed to the idea of its coagulation being the effect of its death; on the other hand, if blood is frozen and then thawed, it coagulates the moment it becomes liquid. We must admit that the blood was dead when frozen, and its coagulation after being thawed cannot therefore be reasonably attributed to its life.† The opinion of the coagulation depending on the escape of carbonic acid, which has been advanced by Sir C. Scudamore, is proved to be equally fallacious by the fact that no carbonic acid has been detected in the blood by the most accurate chemical analysis. Dr. Stevens has attempted to prove that the fibrine partly owes its fluidity within the body to the circumstance of being held in solution by the saline substances contained in the serum; that this saline solution, together with the influence of the living principle and of constant motion, contributes to preserve its fluidity in the vessels, but becomes insufficient to hold it in solution when removed from the body. The insurmountable objection, however, to this hypothesis is, that fibrine is found to be totally insoluble in solutions of neutral salts. Dr. Bostock's explanation of this property of the blood appears to us on the whole the most rational. He states in his valuable *System of Physiology*: "Perhaps the most obvious and consistent view of the subject is, that fibrine has a natural disposition to assume the solid form when no circumstance prevents it from exercising this inherent tendency. As it is gradually added to the blood, particle by particle, while the fluid is in a state of agitation in the vessels, it has no opportunity of concreting; but when it is suffered to be at rest, either within or without the vessels, it is then able to exercise its natural tendency. In this respect the coagulation of the fibrine of the blood is very analogous to the formation of

* Genesis, ix. 4.

† Leviticus, xvii. 11-14. This is the reason of the Jews refusing at the present day to eat the flesh of any animal which has not been bled to death, and of their having their own butchers.

‡ Dr. Hodgkin, having made numerous microscopic observations on the minute structure of various tissues and on the composition of some of the animal fluids, denies that the particles of the blood have a globular form, and gives a description of them totally different from that of preceding physiologists. (Catalogue of the preparations in the anatomical museum of Guy's Hospital, observations on section xi.)

* Dr. Stevens, who has made many experiments on the coagulation of the blood, mentions the following remarkable fact: "If at a certain period after the coagulation has commenced, we add muriate of soda or a saline solution to the coagulating blood, the moment that the fibrine feels the stimulus of the salt, the whole of it becomes suddenly solid; and I have seen the fibrine of inflammatory blood, which had been drawn during the hot stages of the marsh fever, contract on the application of salt with almost as much rapidity as the muscles, when we apply the same stimulus to the fibres in the living body."—Stevens on the Blood, p. 183.

† Elliotson's Lectures, Med. Gazette, Dec. 1831.

organized solids in general, which only exercise their property of concreting or coalescing under certain circumstances, and when those causes, either chemical or mechanical, which would tend to prevent the operation, are not in action.*

But the great argument in favour of the vitality of the blood is its property of spontaneous organization. When the fibrine and albumen are exuded in the form of coagulable lymph, it frequently happens that, although not in immediate contact with any of the surrounding solids, bloodvessels are seen shooting in every direction through the mass of concrete lymph, and it is gradually transformed into a new and perfectly organized living solid, having bloodvessels, lymphatics, and nerves, and performing all the functions of an original texture. The blood and the solids, when submitted to chemical analysis, are found to consist of the same proximate principles, and a similar analogy is observed in their physical structure, both consisting of globules variously united; these different circumstances made Borden apply to the blood the expressive appellation of liquid flesh, *une masse de chair coulante*.

It must, therefore, be admitted that the blood contains within itself the elements of organization, whether or not it be the exclusive seat of the vital principle. The powerful influence of the blood on the vital properties is further proved by the fact that the degree of vigour and activity of animal life depends in a great degree on the qualities of this fluid. If the blood contains a large portion of fibrine and red matter, the animal presents every sign of florid and exuberant health, and is predisposed to inflammatory affections: when the crassamentum of the blood is deficient and pale, and the serum preponderates, a languid state of health is the consequence, and a predisposition to diseases of debility. These opposite qualities of the blood are observed to depend in a great measure on its being brought into contact with either an ample or deficient supply of oxygen, provided always that a due quantity of nourishment is also received through the digestive organs. The vigour and activity of life can thus be partly estimated by the quantity of oxygen consumed, and also by the consequent degree of development of the animal temperature. This has led some to conjecture that oxygen was the principle of life; it can scarcely, however, be considered in any other light than that of a secondary agent; for if oxygen did not meet in the living body with some specific power modifying its action, there is no satisfactory reason why its influence on living animal matter should lead to results differing so remarkably in many respects from those it is observed to produce on inanimate matter.

Theory of inflammation.—After the phenomena of inflammation had for a long period been referred to a vitiated state of the fluids,

and to mechanical or chemical causes, pathologists began to perceive the impossibility of giving a rational explanation of all the morbid changes that mark the inflammatory process by any supposed state of the blood alone, and turning their attention to the condition of the vascular system, they fixed on an increased action of the bloodvessels as its proximate cause. It was found difficult, however, to reconcile the swelling of inflammation, which necessarily requires an increased capacity of the vessels, with the notion of an augmented vital action, which would imply an increase of their contraction. Boerhaave endeavoured to solve the difficulty by attributing the swelling and obstruction to a change in the texture of the blood itself, which, he imagined, became more thick and viscid, acquiring what he called a state of *lentos*; he supposed also that the increased action of the arteries forces the larger particles of the blood into vessels too small to receive them, which constituted the *error loci* of the mathematical pathologists; they conceived that the structure of the globules was very complicated, each red one consisting of six serous, and each serous of six lymphatic globules, for the conveyance of which, vessels of three different kinds and sizes were provided as channels of communication between the arteries and veins, so that if a globule got into a wrong vessel, it might obstruct all those behind it.

For this mechanical theory of Boerhaave, Cullen substituted his hypothesis of spasm and constriction of the small vessels, which, he believed, was sometimes the effect of direct debility, and connected with a diminished energy of the nervous power of the whole system arising from the action of certain deleterious causes on the brain. The necessary consequence of this general spasm of the extreme vessels was a reaction of the heart and large vessels, which had the effect of solving the spasm; this was his theory of idiopathic fever. He conceived also, as another principle in the pathology of inflammatory affections, that there was a peculiar condition of the whole vascular system, which predisposed to and might be induced by local inflammation, and which constituted what he termed the *diathesis phlogistica*; that this consisted in an increased tone or contractility of the muscular fibres of the whole arterial system, which existed generally in persons of the most rigid fibres. The obstruction of the blood in inflammation was thus attributed to spasm; but it was obvious that a state of spasm would be directly exposed to tumefaction; and that, if the first effect of local stimuli were spasm, the very reverse of swelling and redness would take place, the blood being expelled from the vessels of the part, as is seen in convulsions, where it is driven from the surface to the centre of the body; that if also the spasm were the consequence of a previous congestion of the vessels, this congestion should be received as the proximate cause, and the spasm merely as an effect.

Although there exists, no doubt, a habit of

* Elementary System of Physiology, vol. i. p. 444.

body corresponding to the *diathesis phlogistica*, which may predispose to inflammation, it is likewise satisfactorily proved by general experience that inflammation occurs much more frequently in constitutions characterised by lax, mobile, and irritable, than firm and rigid fibres; the inflammatory diathesis cannot, therefore, be always considered synonymous with the diathesis phlogistica of Cullen.

The great difficulty in all the theories of inflammation having been the manner of reconciling the increased action of the vessels, which supposes an increased contraction and consequently a diminished capacity, with the swelling which requires an augmented diameter of the inflamed vessels, several pathologists have had recourse to another hypothesis, by which the idea of increased action is set aside, and local inflammation is attributed to a diminished action of the vessels. This hypothesis was originally proposed about the middle of last century by the Italian physiologist Vacca, and first advocated in this country by Mr. Allen of Edinburgh. According to him the redness, heat, pain, and tumour are to be ascribed to an increased quantity of blood which the vessels contain in consequence of their relaxed state; he attributes those symptoms which had been usually accounted for by increased action, to this partial stagnation of the blood, together with a kind of struggle between the loss of power in the part, and the unusual stimulus to which it is thus exposed.*

This view of the subject had been adopted in a modified form by John Hunter, who supposed inflammation to be a disturbed state of parts which requires a new but salutary mode of action to restore them to their healthy state; inflammation is therefore rather to be considered a salutary operation than a disease. He describes the act of inflammation as an increased action of the vessels, which at first consists simply in an increase or distention beyond their natural size, this increase apparently depending on a diminution of the muscular power of the vessels, at the same time that the elastic power of the artery is increased in the same proportion: this is, therefore, something more than simply a common relaxation, and Mr. Hunter calls it an act of dilatation—an hypothesis, however, devoid of proof. He says that, owing to this dilatation, there is a greater quantity of blood circulating in the part, and that it passes more rapidly through the vessels; the swelling is also partly produced by an extravasation of coagulable lymph with some serum, the lymph differing from the common lymph in consequence of passing through inflamed vessels.

The theory of a diminished action of the vessels was embraced also by Dr. P. Wilson,† Dr. Thomson, and Dr. Hastings, who all performed a variety of experiments in its support. Dr. P. Wilson first shewed that he could create increased action in the capillaries without exciting inflammation; but whenever

inflammation was established, he found the capillaries in a state of preternatural distention and debility; whilst the larger arteries experience an increase of action, which, by keeping up a strong *vis a tergo*, tends to augment the inflammation. If, however, the inflammatory action continues, the vessels immediately preceding the inflamed capillaries become also distended, and consequently debilitated: in short, according to Dr. P. Wilson, inflammation seems to consist in the debility of the capillaries, followed by increased action of the larger arteries, and is terminated by resolution, when the capillaries are so far excited, and the larger arteries so far weakened by the preternatural action of the latter, that the power of the capillaries is again in due proportion to the *vis a tergo*. He refers many of the more general phenomena of inflammation to the sympathetic influence of the nervous system.

Dr. Thomson draws from his experiments inferences rather at variance with those of Dr. P. Wilson, for he conceives that it is not necessary to the establishment of Mr. Allen's hypothesis to admit that the capillary circulation is slower in inflammation. "I am inclined to believe," says Dr. Thomson, "that a diminished velocity of the blood in the capillary branches is by no means a necessary, constant, nor even the most common effect of incipient and moderate degrees of inflammation."‡ He considers that the velocity is sometimes increased and sometimes diminished.

This difference in the statements of these two gentlemen induced Dr. Hastings to repeat their experiments, in order, if possible, to reconcile them: and he came to the following conclusion: "that certain stimuli applied to living parts produce an increased velocity of the motion of the blood and a contraction of the bloodvessels. During this state of excitement the part affected is so far from giving any thing like the appearances of inflammation, that the size of the vessels is diminished and the part paler. But if the stimulus be long-continued or increased in power, the small vessels, which in the natural state admit only one series of globules, become so dilated as to allow an accumulation of a much less fluid and redder blood in them, which loses its globular appearance, and moves much more slowly than that which previously passed through these vessels: the part now appears inflamed; if the stimulus be removed, the vessels do not soon regain their original state; time is necessary to allow them to recover their contractile power, so as to prevent the impetus with which the blood is propelled by the heart and large arteries from keeping up the dilated state of the capillaries." "It may be logically inferred, therefore," says Dr. Hastings, "that inflammation consists in a weakened action of the capillaries, by which the equilibrium between the larger and smaller vessels is destroyed, and the latter become distended." Dr. Hastings argues that Dr. Thomson's belief in the excitement of the capillaries in some cases of inflammation, arises from his having

* Thomson's Lectures on Inflammation, p. 68.

† Treatise on Febrile Diseases.

‡ Op. cit. p. 75.

denominated a state of inflammation that which ought not to be so called, being only that temporary excitement of the capillaries generally preceding their debility, which is inseparable from inflammation.*

The late Dr. Parry, of Bath, whose researches on the functions of the vascular system have deservedly attracted so much notice, necessarily rejected the opinion of diminished action of the capillaries in inflammation, since he denied that the capillaries possess any independent muscular power, asserting that the blood was propelled through them by the contraction of the heart alone. He attributed inflammation to an increased momentum of the blood in the part affected, and therefore to an increased passive action of the capillaries. This hypothesis has been strongly advocated by Mr. James, of Exeter, in his treatise on inflammation. The facts brought forward, however, in support of the opinion that the extreme vessels possess a contractile power, appear to us so convincing and satisfactory as to set aside completely the opposite theory.

In all the preceding theories the contractility of the vessels only seems to have been taken into consideration, whilst the other great vital property—the sensibility of the part—has been almost entirely overlooked. Sufficient attention also does not seem to have been paid either to the changes of the blood or to the modifications both in the structure and functions of the part which characterize inflammation, and vary considerably in its different periods. Each theory appears to contain much that is true, especially that of Dr. Hastings, but to be constructed on too narrow a basis, incapable of satisfactorily accounting for all the facts.

The experiments have been repeated with care by several continental pathologists, and especially by Gendrin† and Kaltenbrunner‡. The former has investigated with considerable attention the whole pathology of inflammation, and has given a luminous description of several important phenomena, especially those of supuration; he adopts the opinion of an increased action of the vessels being the primary cause of inflammation. Kaltenbrunner's microscopic researches have been much more minute, accurate, and conclusive than those of any of his predecessors, and afford an excellent specimen of experimental inquiry conducted in a truly practical and philosophical spirit: he confines himself, however, to a description of the obvious phenomena without entering upon any theoretical reasoning. As the limits of this article do not admit of a separate account of experiments, we shall give a description of the different stages of the inflammatory process, as deduced chiefly from the results of Kaltenbrunner's observations, and shall state, as we proceed, the conclusions we have adopted respecting the nature of the phenomena of inflammation.

When a stimulus is applied to a living part, the first effect produced is an excitement of the sensibility of the part, and, with some exceptions, a consequent degree of pain: this, however, soon subsides, if the irritation be only slight or temporary; but when the effect of the stimulus is either severe or prolonged, the contractility of the vessels of the part is next roused into increased action; the necessary result of this morbid excitement of the sensibility and contractility of the vessels is a more rapid flow of blood to the part, which, acting itself as a stimulus, tends still more to quicken the circulation: there is consequently a considerable influx of blood in all the vessels, arteries, capillaries, and veins, to the amount, perhaps, of double or triple the usual quantity; and as the vessels of the surrounding parts do not partake of this increased action, the blood of the irritated vessels is not carried off as quickly as it arrives, and must inevitably soon accumulate. Bloodvessels, like all other contractile and elastic tubes and tissues, are capable of having their capacity and other dimensions increased within certain limits, without any sensible diminution of their power of contraction or of their mechanical strength; the stimulated vessels thus adapt themselves to the increased flow of blood by becoming enlarged, whilst they still preserve their control over the circulating current. Vessels, which in their natural state were scarcely perceptible, owing either to the admission only of a thin colourless blood or to their extreme tenuity, now become dilated and visible, a red and more viscid blood being propelled through them. Boerhaave and the mathematical pathologists had accurately noticed this admission of the red globules into vessels from which they were previously excluded, calling it an *error loci*.

The pressure of the blood is sometimes greater, however, than the vessels are able to resist; this more particularly happens when the irritation has extended to the larger arterial branches and to the heart, so as to excite a strong *vis a tergo*. The strength and action of the smaller vessels diminish as their distention increases; the circulation, which was at first accelerated, now becomes gradually slower, and may continue in a languid and oppressed state for a considerable length of time without being completely interrupted. Under these circumstances the healthy functions of the part are necessarily more or less impeded; the blood ceases to undergo its usual change from arterial to venous; the red globules, which were before confined to arteries, are now seen circulating in the small veins; these globules are more numerous and of a more vivid red; the viscosity and coagulability of the blood seem augmented by a decrease in the proportion of its serum; and the globules, having a tendency to unite together, become less distinct; the functions of nutrition and secretion are also partially or wholly suspended.

The part affected now presents the following morbid conditions: an increased influx of blood and turgid state of the vessels—some degree of swelling and pain—an increase of heat, and, in certain textures, of redness, which

* On Inflammation of the Mucous Membrane of the Lungs.

† Hist. Anat. des Inflam. tom. ii.

‡ Répert. Général d'Anatomie, et Physiol. Path. tome iv. p. 201.

disappears on pressure—the circulation either much quickened, or slow and embarrassed, with suspension of the healthy functions. These changes constitute a distinct period of disease, which has too often been mistaken for inflammation, but which it is highly important should always be distinguished as its previous stage only, and may be named *active congestion*. The existence of a morbid state, such as we have just described, is of common occurrence in a variety of diseases, and frequently subsides without passing into inflammation. When, however, by the increase of the diseased action, inflammation supervenes and is fully developed, a series of perfectly new and distinct morbid phenomena are observed, which will be presently noticed.

Congestions are sometimes formed, however, in a different manner. If the vessels of a part (arteries and veins) have been much weakened, as happens from a variety of causes, or if there be any obstruction to the return of the blood through the veins, an accumulation of blood, a languid embarrassed circulation, vascular turgescence, and several of the other symptoms of congestion, will necessarily follow, without requiring the previous application of a stimulus. The increased influx of blood sometimes proves a sufficient stimulus to excite a reaction in the vessels of the part, an accelerated circulation, and a state of active congestion, which may lead to inflammation. In other cases, however, no reaction takes place; the vessels remain in a turgid, loaded, debilitated condition, with a languid circulation, constituting a *passive* form of congestion. The characters of these and of some other varieties of congestion will be more fully examined in another place.

When congestion begins to subside, a diminution in the activity of the circulation and influx of blood is first observed at the circumference; the blood seems to reflow from the circumference towards the centre; the swelling, pain, heat, and other symptoms gradually disappear. The resolution of congestion is generally promoted by critical discharges. In some cases there is a slight exhalation of a serous or sanguineous fluid either on the surface of the part or in the interstices of the vessels; an exudation of small red scales is sometimes perceptible through the microscope. The congested vessels may be relieved by a profuse flow of the natural secretions, as is frequently seen on the surface of mucous and serous membranes, or else by spontaneous hemorrhage.

It is important not to mistake for congestion or inflammation various changes in the state of the circulation that sometimes immediately follow the application of certain stimuli to a living part, and are only of a temporary nature. Simple compression is sufficient to cause a momentary interruption of the circulation and stagnation of the blood; the application of muriate of soda to the web of a frog's foot is followed by a diminution of the velocity or a complete stoppage of the circulation, and a remarkable increased redness of the blood; the immediate effect of a slight wound is an accelerated cir-

culation, an increased flow of blood, redness, and other symptoms of incipient congestion; alcohol produces similar results, and sometimes a constriction of the vessels. All these changes, however, are only the immediate consequences of the mechanical or chemical action of the stimulants on the vessels, and of temporary nervous irritation, and do not of themselves constitute congestion or inflammation. When the irritation is slight, the increased activity of the vessels and influx or stagnation of blood soon disappear, after the removal of the irritating cause; but if the irritation has been prolonged or severe, and particularly if it has occasioned any extensive and permanent injury to the texture of the part, a reaction takes place soon after the changes just described have subsided, and a new process, *essentially vital*, is set up, intended to remove the irritating cause, or repair the injury it has inflicted; the circulation is consequently observed to assume again an increased activity, and the regular symptoms of congestion or inflammation are gradually developed. This is an important circumstance attending the process of inflammation, which had been noticed by Dr. Hastings, but has been since more clearly and accurately defined by Kaltenbrunner; and mistakes have no doubt been made in several accounts of the theory of inflammation from its having been overlooked.

The interval between the application of a stimulant and the development of the regular congestive or inflammatory process, may be considered as a period of *incubation*. The duration of this period is very variable; on the edges of wounds, where it is well marked, it may last several hours. The inflammation, however, does not always shew itself in the part to which the exciting cause has been first applied, but in some other more or less remote; a variety of medicinal and poisonous substances applied to the external or internal surfaces of the body, frequently excite irritation or inflammation either in some of the secreting surfaces and organs, in the brain and nervous system, or in the heart and large vessels; and they produce this effect either by being absorbed and conveyed with the blood, or by their direct impression on the nervous system. Some animal poisons excite inflammation both in the part to which they are immediately applied, and in remote organs, as happens with the virus of hydrophobia, variola, &c. This secondary or sympathetic inflammation is not always the effect of irritating but frequently of depressing agents, acting on distant parts; a state of debility, or the suppression of the functions of one organ, becomes thus a very common cause of congestion and inflammation in another. All causes that operate in lessening the circulation on the surface or at the extremities of the body tend to produce determinations of blood, and an inflammatory reaction in some of the internal organs. The slow and long-continued influence of such causes often gives rise to continued fever; or, when more sudden and active, to local inflammation. In all these cases a greater or less period of time may elapse between the application of the ex-

citing cause and the development of the disease; this is particularly the case with certain animal poisons, which may remain for some time circulating with the blood before they produce their specific effects. The consideration of the symptoms, duration, and treatment of the period of incubation, embraces some highly interesting questions, especially with respect to contagious diseases, as Dr. Marsh has shewn in an excellent essay on this subject, published in the Dublin Hospital Reports.

We are next to consider the morbid changes that occur when congestion passes into true inflammation. If the action of the irritant be either violent or repeated, the appearances characteristic of active congestion extend from the centre to the circumference over a larger surface; the swelling and other symptoms increase in intensity, until the vessels are at last so gorged with blood that the strength and activity of their contractile fibres are overpowered; the vessels become therefore less and less able to resist and propel the current of blood, until its motion completely ceases; the blood then stagnates in the vessels, where it undergoes certain changes in its composition. This stagnation of the blood does not take place in the whole extent of the inflamed surface at once; the circulation first becomes slower, and the blood stagnates in some of the vessels at the centre; it then stops in others, forming sometimes several small nuclei of stagnation, which decrease in number and size towards the circumference, where the circulation continues more accelerated, and the part is in a state of active congestion. These changes occur first in the weaker vessels (the capillaries and veins), and afterwards in the arteries.

The following are the alterations observed in the composition of the blood; as the heat and other symptoms increase, the blood becomes less serous, more viscid and coagulable, and of a more vivid red; its course is altered, and a number of the globules are seen agglutinating together so as to form minute cylindrical clots; these are pressed in small columns from the capillaries into the veins, and move slowly in various directions, oscillating backwards and forwards until they become motionless; the blood is then evidently decomposed, so that the globules and serum can no longer be distinguished from each other, and it presents a red homogeneous coagulated mass, a part of the serum being generally expressed and effused around it. Motion, it is well known, is indispensable to the preservation of the globular appearance of the blood. A momentary vacuum is sometimes observed in the vessels between these coagula.

Another important occurrence, at this stage of the inflammatory process, is the bursting of a number of the over-distended vessels, and the extravasation of the blood in the surrounding texture, from which it is inferred that a diseased state of the coats of the bloodvessels is one of the immediate effects of inflammation, not less important than the changes in the composition of the blood. The acute inflammation of a large bloodvessel is characterized by redness, rugosity, thickening and

softening of its internal membrane; the coagulated blood either adheres to it immediately, or through the intervention of a layer of effused lymph; the middle and outer coats are also injected, thickened, and much more friable; and the whole texture of the vessel having lost its density and elasticity, is very easily torn. We may safely conclude that the inflammation of smaller vessels will be attended with nearly similar changes of structure.

The points of stagnation are easily distinguished by their more vivid red colour, and the redness differs from that of congestion in not being removed by pressure. The colour varies, however, considerably according to the intensity of the inflammation, the texture of part, and the nature of the exciting cause. In very intense inflammation there is a livid red, which becomes black in gangrene. Muriate of soda produces a dark purple red; alcohol a bright clear red, and muriate of mercury a brown dusky red. The rapidity with which the course of the blood is interrupted, the number and extent of the points of stagnation, depend likewise on the same causes. When the inflammation is intense and the circulation very rapid, the blood does not stagnate so soon; but the points of stagnation are more numerous and extensive. When alcohol is applied to the web of a frog's foot, the circulation is quickened, and after some time a few points of stagnation may be seen; a fresh application of alcohol to the same part is followed by an increased activity of the circulation; the small coagula previously formed are sometimes again set in motion by the increased force and velocity of the current of blood, and the obstruction of the vessels is thus removed. Any new interruption in the course of the blood will take place more slowly, in proportion as the activity of the circulation is kept up by fresh applications of alcohol. The same results follow the infliction of wounds of different degrees of severity, and the application of other stimuli. It has been ascertained by Kaltenbrunner, that in highly vascular organs, in which the circulation is very rapid, such as the lungs and the mesentery, more time is required for the perfect development of the inflammatory process, than in organs whose circulation is more slow, such as the liver; but that when the inflammation is once established, it is much more intense in the former than in the latter. In cold-blooded animals, the susceptibility to the influence of stimulants being comparatively feeble, the circulation is only moderately increased under their application. Inflammation is on this account quickly established by the stagnation of the blood, but seldom violent. It may be stated as a general principle, that the rapidity with which the inflammatory action is fully developed is in the *inverse* ratio, and the violence and extent of the inflammation in the *direct* ratio, of the activity of the exciting cause.

It has already been observed that the blood ceases to undergo its change from arterial into venous during congestion and inflammation, and that the functions of nutrition and secretion are also completely suspended. There is

sometimes also an apparent absorption of certain portions of the inflamed tissue; the stellated black spots of the frog's web gradually disappear, when the blood is kept for some time in rapid circulation through its vessels, and small particles of the pigmentum may be seen carried away by the current of the blood. The fat of the mesentery and the earthy matter in bones is removed in a similar manner.

Another striking phenomenon is the formation of new canals or vessels by globules of blood bursting through the sides of a vessel and forcing a passage for themselves through the cellular texture into another vessel. A considerable number of new canals are sometimes formed by this mechanical process, through which the blood continues to circulate. This interesting phenomenon has been frequently observed by Kaltenbrunner in the inflamed mesentery of the rabbit. We have not had an opportunity of verifying it; but it is easy to conceive a number of the small delicate cells of the cellular tissue being united together by the forced passage of the blood, and forming new tubes. This is strictly analogous to what takes place in the organization of coagulable lymph, where the globules of the blood may be seen forming new passages for themselves by shooting in every direction through the mass of soft lymph.

Beside the extravasation of blood into the parenchyma of the inflamed part already noticed, there is also a certain degree of interstitial effusion. In all animal tissues, during health, there is a constant exhalation of a fluid in the form of vapour between their fibres or laminae. Gendrin gives the following description of the section of an inflamed part. Towards the centre it exhibits an infiltration of nearly pure blood, disposed in small coagula, and having sometimes a globular appearance, these coagula being surrounded with a gelatinous fluid. In some cases, instead of red blood, there is found a yellowish semi-concrete fluid resembling fibrine, and when inspected with the microscope, apparently partly composed of globules. On the outside of this concrete deposit, there is a reddish fluid half serous and half gelatinous, containing only very few globules; and quite at the circumference there is found pure œdema, with which almost all inflamed parts are more or less surrounded.

We have thus given an account of the various local effects which have been ascertained by observation and experiment to follow the application of stimulants to the living body, from the slightest degree of irritation to the perfect development of inflammation. It has been shewn that a morbid excitement of the sensibility is the first effect arising from the application of stimulants, and that from which all the other phenomena of inflammation seem to derive their origin: the diseased action, moreover, never completely subsides until the sensibility has been restored to its normal state, so that this morbid condition of the sensibility may be considered as operating in a manner strictly analogous to the *ideal thorn* of Van Helmont. Other morbid agents act in

depressing the sensibility and causing a diminished vascular action and a stagnation of blood, which is often followed by inflammatory *reaction*. This primary influence of the sensibility over the phenomena of inflammation is a circumstance which does not appear to have received hitherto the degree of attention it deserves. It will be seen hereafter that nearly all the modifications of inflammation may be traced to some of the infinite variety of morbid conditions which the sensibility is capable of assuming. The intimate connection between the vascular and nervous functions, and the influence especially of the nervous system over the circulation of the extreme vessels, strongly corroborate the accuracy of the preceding views.

In considering the action of stimulants on the animal economy, it appears also that sufficient attention has not been paid to the fact that they excite a series of distinct morbid changes, passing gradually into each other, and whose characteristic differences have not been hitherto well defined. Genuine inflammation is never established instantaneously, but is always preceded by certain deviations from healthy action, which constitute preliminary stages. We conceive, therefore, with Kaltenbrunner, that the morbid changes which lead to inflammation may be divided into the three following periods.

1. A period of *incubation*, variable in its signs and duration. A better knowledge of the pathological condition of the system during this period might lead to the adoption of means capable of preventing the development of disease, and of destroying it as it were in embryo.

2. A period of *congestion*, characterized, first, by an increased activity of the vessels and influx of blood—various degrees of turgescence, swelling, heat, redness, and pain—interruption of the healthy functions of the part—and, secondly, as the congestion increases, a laboured slow circulation arising from the over-distention of the vessels, and increased thickness and viscosity of the blood. There is yet, however, no change of structure in the part, nor formation of new products; the circulation, although slow, is still carried on or only very partially interrupted, and the affection may subside by critical secretions and hemorrhage.

3. The period of *inflammation*, which is characterized by an entirely new order of morbid changes. The circulation is completely interrupted—the blood coagulates, clogs the vessels, and stagnates in several points of the inflamed part—the coats of the vessels are diseased—some of the vessels are ruptured, and there is extravasation either of blood or coagulable lymph in the parenchyma—lymph and serum are also exuded, and the deposition of these new products leads to a decided change of structure—the healthy functions of the part are completely suspended, and some of its constituents, such as the pigmentum and adipose matter, are sometimes absorbed—new vessels are also mechanically formed by the blood forcing itself a passage through the deli-

cate areolæ of the cellular texture. All these changes are attended with a considerable increase of the swelling, heat, redness, and pain.

Congestion and inflammation pass so gradually into each other, that they are necessarily always combined, and it may often be extremely difficult to draw an exact line of demarcation between them. The stagnation of the blood, effusion of blood, lymph, or serum, either by exudation or rupture of the vessels, the changes in the structure of the part, and formation of new products, may generally be considered, however, as the pathognomonic signs of inflammation. The interruption of the circulation and extravasation of blood are not sufficient of themselves to constitute inflammation, since they are observed to take place in many cases of local or general vascular debility, the very opposite of inflammation, as, for instance, in ecchymosis, scorbutus, &c. It is only when these symptoms have occurred in conjunction with a series of certain other morbid actions, both preceding and following them, that they can be said to indicate inflammation.

It is assuredly neither rational nor philosophic to apply to these varied morbid phenomena of the inflammatory process but the one hypothesis of either increased or diminished action. It appears also incorrect to describe vessels, which performed their functions efficiently during health, as affected with *direct* debility, because they are unable to perform double their usual labour with equal efficiency in disease, as is the case with the vessels of an inflamed part. It is impossible to deny that, unless under peculiar circumstances forming exceptions to the general rule, the action of the vessels is at first greatly and powerfully increased, and it is only when they become clogged and over-distended by an excess of blood, and by blood less thin and fluid than that which they contain in health, that being no longer able to contract, they become passive. Direct debility of the small vessels cannot, therefore, correctly be admitted as the primary cause of inflammation, since we only see debility occur as a *secondary effect*. Weak and relaxed vessels are themselves susceptible of increased action, and often in a much greater degree than vessels in the opposite state; for it is well known that constitutions in which the fibre is lax and delicate are generally characterized by a much higher degree of mobility and irritability, and are much more predisposed to inflammation than constitutions endowed with a more firm and rigid texture of the solids. While delicate and sensitive vessels are easily roused into excessive action, they are less able to sustain it, and are, therefore, more readily overcome by the increased flow of blood, and more quickly affected with inflammation: this is fully exemplified in infants. But although the weak and delicate structure of vessels predisposes them to inflammation, still increased action is a primary condition necessary in most cases to its development. We may also add, in opposition to the hypothesis of direct debility of the vessels, that the exciting causes and treatment of inflammation coincide better

with the idea of excessive than of defective action.

The following summary gives a condensed view of the series of morbid changes that have been described as occurring in the inflammatory process:—Increased sensibility of the part, followed by increased action of the vessels—quickenened circulation—increased influx of blood—dilatation of the small vessels and capillaries—admission of red blood into vessels previously colourless—turgescence—swelling—and sometimes a slow and embarrassed circulation—*active congestion*. If the diseased action continues, the contractility of the vessels is paralysed by their over-distention—the blood stagnates and undergoes changes in its composition—disease of the coats of the blood vessels—rupture of many of the vessels—extravasation and effusion of blood, coagulable lymph, and serous fluid—changes in the structure of the part affected—*inflammation*.

This view of the theory of inflammation has the advantage of accounting in the most satisfactory manner for many of the modifications of common inflammation. The exciting cause may be of such a nature as at first to stimulate both the sensibility and vascular contractility of the part, and induce a degree of congestion. But if its action be increased beyond a certain point, it may have an opposite effect in lessening both the sensibility and vascular contractility, and inducing a state of torpor; the blood will then stagnate, not from excessive irritation and over-distention of the vessels, but in consequence of their deficient vitality and relaxed condition. This is frequently the mode of operation of cold, and of several stimulating narcotics and animal poisons, which excite a peculiar form of low sub-acute inflammation, requiring a specific mode of treatment.

In another variety of inflammation, the sensibility is directly weakened or completely paralysed, without previous irritation. There is at first no increased action of the vessels, or greater influx of blood; but the contractility and sensibility of the vessels being lowered or nearly paralysed, the current of the blood becomes extremely languid, and finally stops; reaction is generally excited in this case by the *vis medicatrix nature*, and a low kind of inflammation supervenes, which may terminate rapidly, either in unhealthy ulceration or gangrene. The living parts are then separated from the dead by a line of acute inflammation. The nervous power and vascular action of a part may be impaired or destroyed, as just described, by causes acting more immediately through the medium of the nervous influence, such as electricity, galvanism, intense cold, some very active narcotics, the ligature of large nerves, &c.; or by noxious substances taken into the blood, and materially altering its properties; or else by a deficient supply of arterial blood in consequence of the ossification and other organic diseases, or the pressure or ligature of large arteries. It remains, however, yet to be decided, whether the blood may not be considered the sole vehicle of all morbid agents, without its being

necessary to have recourse to nervous agency in order to explain their effects. The great rapidity of action of some deadly poisons seemed to favour the opinion of the nervous influence being exclusively the medium through which they operate. It would appear, however, from some recent observations, that morbid principles can be conveyed by the blood to remote parts of the body much more rapidly than was formerly imagined. This is an intricate but highly interesting question, requiring to be submitted to further investigation.

The preceding theory of inflammation enables us also to give a satisfactory explanation of the opposite mode of treatment often required in the different stages and modifications of inflammation. It is thus easy to explain, for instance, why local and general depletion are useful in the first stage of inflammation, in lessening the irritation and increased action of both the nervous and vascular systems; in reducing the quantity of the blood, and thus preventing the over-distention and obstruction of the vessels, and the extravasation consequent upon their rupture; in lessening, moreover, the viscosity, thickness, and coagulability of the blood, which is the constant effect of free depletion: why, on the contrary, in cases in which the exciting cause has more directly weakened the nervous and vascular action of the part, as is the effect of cold and of a variety of poisons, stimulants may be required from the beginning:—how, also, stimulants, when cautiously used, may in the latter stages of inflammation assist in restoring the weakened or oppressed action of the nervous and vascular systems, and in this manner facilitate and hasten the elaboration and expulsion, or the absorption of the morbid products, by which means the sequelæ of the disease are removed:—and why, also, the application of a stimulus, different from that which produced inflammation, will sometimes bring on resolution.

Having followed the changes that attend the inflammatory process up to its full development, we proceed to trace them in its ulterior stages. Before the inflammation has reached its greatest height, and any considerable change of structure has taken place, it may gradually subside. The frequency of the circulation begins to decrease at the circumference, and there is a reflux of the blood towards the centre; there are critical exudations through the sides of the vessels, consisting of a thin serous or sanguineous fluid, poured out on the surface or in the cellular texture of the part, similar to those already described in congestion; there may be profuse exhalation of fluids on the secreting surfaces; the small coagula of lymph and blood contained within the vessels, or deposited in the parenchyma, are softened and removed, either by the impetus of the current of the blood within the vessels, or by interstitial absorption. The tumefaction, heat, redness, and pain, gradually subside: this is the most favourable mode of termination of inflammation, called resolution.

In more severe inflammation, when the texture of the part has suffered greater changes, it

is frequently restored to its healthy state, and the effects of the disease are removed by a different process, which leads to the formation of a new fluid called pus. For a long period suppuration was believed to be the result of a dissolution of the living solids after they had been broken down by inflammation, and pus was supposed to possess a corroding power, by which it continued the dissolution. These opinions were, however, completely set aside by the more rational theory of this fluid being formed by a process of secretion. The origin of this morbid fluid has been traced still further by Laennec and Gendrin, who consider suppuration as the result of a direct conversion of the coagulable lymph of inflammation, and of the fibrine of the blood, into pus. Laennec believed pus to be simply softened coagulable lymph; coagulable lymph is found by analysis to consist not only of the fibrine of the blood, from which it differs by its lesser consistency, but also of a small proportion of albuminous serum; it is supposed therefore to be formed of an intimate combination of the fibrine of the blood with a small portion of albumen, rendered more viscid and coagulable by the vital influence of the inflammatory action, and deprived also of the colouring matter. The opinion that pus is formed directly from the blood by the fibrine simply undergoing some slight modifications in its properties during inflammation, is supported by the following interesting experiments of Gendrin, which will require, however, to be repeated by others before the important conclusions to which they lead can be considered as fully established.*

If any portion of an artery or vein be included between two ligatures, the intercepted blood at first coagulates; a portion of the serum is absorbed; a slight degree of inflammation is excited in the inner membrane; the globules of the coagulum lose their colour; a thin stratum of coagulable lymph is deposited on the sides of the vessel, forming a medium of adhesion between the clot and the internal membrane; and the clot itself becomes gradually organized. There is in this instance adhesive inflammation, and organization of the blood, without suppuration. But if a stimulating injection be thrown into a portion of a bloodvessel, the circulation having been previously suspended by means of ligatures, and if, after it is withdrawn, blood be again admitted and retained within the vessel, a more violent degree of inflammation is excited on the internal membrane, instead of the coagulable lymph, and the entire clot becoming organized, they are observed to acquire less consistency; small yellow globules are soon perceived between their layers, and they gradually undergo a more or less complete conversion into genuine pus. It is stated that these successive changes can be very distinctly watched with the aid of the microscope, and that they may sometimes be observed in cases of aneurism and phlebitis. If blood taken from one dog be injected into

* *Histoire Anatomique des Inflammations*, vol. ii. p. 470.

the cellular texture of the axilla of another, it soon coagulates, a slight degree of inflammation takes place, and the injected blood is gradually absorbed; but if a higher degree of inflammation is excited by any stimulating injection, or the passing of a seton, the blood, instead of being absorbed, is rapidly converted into pus: it would appear, therefore, that a certain degree of inflammation is indispensable for the transformation of extravasated blood or lymph into pus.

It is deserving of notice that venous blood appears to possess a greater tendency to conversion into pus than arterial, while the latter is much more disposed to become immediately organized; and likewise that suppuration is favoured by a high degree of inflammation, whilst immediate organization is more generally the result of moderate inflammation: these considerations point to a variety of important practical precepts.

Suppuration, however, is not merely the result of the conversion into pus of a mass of extravasated blood or coagulable lymph, but takes place both on the surface and in the interior of inflamed organs by a regular process of secretion, through the medium of vessels either previously in existence or newly formed. It constitutes in this manner a new function, which sometimes persists for a considerable period after the inflammation has subsided, as is seen in fistulous sinuses, chronic ulcers, setons, &c. Gendrin has minutely investigated the nature of this process by exciting violent inflammation in the web of a frog's foot and in the mesentery by means of a seton, the actual cautery, or boiling water, and watching its progress with the microscope. The following interesting account of the result of these experiments is favourable likewise to his opinion of the globules of fibrine being directly converted into globules of pus.*

After the inflammation has attained its height, the circulation remains for some time stagnant, the vessels and intermediate cellular texture being both filled with coagulated blood and lymph; the colouring matter gradually disappears, the part assuming more and more an opal tint; small yellow soft molecules may be seen interspersed through the coagulum, and some of them agglomerating in large globules evidently purulent. A slow degree of motion gradually becomes apparent by the oscillation of some of the globules in the old vessels; whilst a passage seems to be made for others through the mass of softened lymph by the formation of new canals, especially near the surface. It is stated, moreover, that the various alterations which the globules of the blood undergo during their conversion into pus can be distinctly followed by the eye, especially in the bloodvessels of the mesentery; that the globules are first seen corrugating themselves and separating from their colouring envelope; that they then lose their transparency, becoming, as they approach the edge of the wound where the irritation is the strongest, more opaque, larger, softer, and completely converted into purulent

globules. Small lacerated portions of the substance of the part are in some cases apparently dissolved by and carried along with the pus. The vessels soon become more distinct and numerous, and the circulation more regular, although it continues very slow as long as the vessels convey pus. As the swelling subsides by the discharge of the pus, the vessels in the centre re-admit red blood, and their circulation becomes more active. As soon as the suppuration ceases, a coagulable globular lymph of a pale flesh colour, and covered with red streaks, is exuded on the surface of the wound instead of pus; the red streaks are converted into vessels, by means of which the stratum of lymph becomes organized, and the cicatrization is completed. When suppuration is prolonged and rendered habitual by artificial means, the vessels secreting pus are increased in size and number, and assume a more regular action.

Gendrin concludes from his experiments that the conversion of the fibrine of the blood into pus takes place independently of the action of the vessels or of any vital influence of the inflamed part, and by a mere chemical process not yet well known. This is an opinion, however, which we think scarcely admissible, for it would be extremely difficult to account for the great varieties observed in the qualities of pus in different forms of inflammation, and especially for its *specific* properties in certain diseases, on any other principle than that of referring them to the vital influence of the diseased vessels, as at least one of their essential causes.

The preceding, which is the most simple form of the suppurative process, usually attends mild inflammation. In violent inflammation, when the parenchyma has been much lacerated by the extravasation of blood and coagulable lymph, instead of the pus being entirely collected in vessels, it accumulates towards the centre of the tumour, where it is mixed with loose fragments of cellular tissue and coagulated blood. When the loss of substance has been considerable, the circulation is only partially restored, and the parts destroyed may undergo a degree of putrid fermentation; the pus itself assumes a dark livid colour and an acid unhealthy character, and this leads to gangrene or sphacelus. Suppuration in this case takes place more by a process of decomposition than of regular secretion; it is a species of imperfect suppuration.

The alterations which the blood and other fluids undergo in different textures during inflammation, correspond in general to those just described as occurring in the cellular texture; they present, however, a few modifications, which we shall notice in this place, in order to give a complete and connected view of the nature of the inflammatory process.* When a serous membrane, as, for instance, the pleura, is slightly inflamed, there is, first, an effusion of a yellowish serous fluid, slightly viscid and alkaline, and consisting almost entirely of a small portion of albumen held in solution by water.

* See Gendrin, *op. cit.* Alterations des fluides, &c. vol. ii. p. 492, from which the facts contained in the following account have been partly derived.

* *Op. cit.* vol. ii. p. 477.

As the inflammation increases, the surface of the membrane is lined with a thin layer of a soft viscid substance of a greyish colour, consisting of a semi-transparent jelly, interspersed with small globules of a yellow tint, and characterized by the property of spontaneous coagulation. This coagulated substance increases in thickness, viscosity, and density with the inflammation, constituting on the third or fourth day a distinct plastic, laminated, pseudo-membrane. When submitted to analysis, this membrane is found to consist of fibrine with a small proportion of albumen, and corresponds in every respect with the coagulable lymph of phlegmonous inflammation; it is insoluble in water, otherwise it would be dissolved by the serous fluid contained in the cavity of the membrane, instead of adhering to its surface. The serous fluid poured out at this period of the inflammation loses its transparency, becomes turbid, viscid, and more alkaline; its albumen is considerably increased, and it deposits a greyish flocculent coagulable matter, exactly similar in its properties to false membrane, containing only a larger proportion of albumen and aqueous fluid. When the inflammation has lasted several days, the liquid assumes a yellow or greenish tint, and there is added to the coagulable lymph a yellow viscid matter, which is deposited in a pulverulent form, is soluble in alkalies when dried, and when examined by the microscope, presents all the appearances of globular pus. A large proportion of this last mentioned matter is formed in violent inflammation, giving the effused fluid a well-marked purulent appearance, and a quantity of pus is sometimes deposited, as pure and genuine as that coming from an abscess. The inflammation of all serous membranes is followed by similar results. In the inflammation of synovial membranes the viscid, oily, albuminous synovia is likewise converted into coagulable lymph or pus, according to the intensity of the inflammatory action.

The fluid secreted by mucous membranes consists, in health, of animal mucus held in solution by an aqueous fluid, and containing a small quantity of saline matter; the proportion of these ingredients varies in the different mucous membranes, and other elements are added to them in some, such as muriatic acid in that of the stomach, a sebaceous matter in that of the ear, &c. In active congestion or commencing inflammation, there is generally more or less increase of the natural secretion; it has in ophthalmia the appearance of thin viscid yellow mucus; in coryza it is more fluid and of a yellow white; in bronchitis it is transparent and viscid, like the white of an egg mixed with water; in diarrhoea it is very watery and copious, with white flakes floating in it; it is also more or less tinged with bile. In inflammation of the vagina and urethra it is thin, white, and transparent; in inflammation of the urinary bladder it is mixed with the urine, in which it floats in the form of viscid flakes. In all these cases the mucus has been found slightly alkaline, except that of the digestive tube, which remains acid. This alkaline property is owing to the presence

of a small quantity of soda. These copious secretions of thin mucus often prove critical, in relieving attacks of congestion or slight inflammation.

In more acute inflammation there is excreted in the beginning a very acrid seromucous fluid, which excoriates the lips in coryza, the cheeks in ophthalmia, the anus in diarrhoea, and the internal surface of the thighs in leucorrhœa; this thin acrid mucus is sometimes streaked with blood, as in bronchitis and dysentery. It differs from the mucus of congestion or mild inflammation by coagulating in boiling water and containing albumen; its acidity is due to the presence of alkali (soda); the quantity of albumen is sometimes so considerable that it floats in the thinner part of the fluid in white lumps, differing in no respect from the albumen contained in the serum of the blood, but that there is mucus incorporated with it. At this period of the inflammation there is sometimes an exudation of fibrine as well as of albumen, and this leads to the formation of the false membranes frequently found in the larynx, the trachea, or in some portions of the alimentary canal. As the inflammation advances, the secretion lessens in quantity, and it becomes completely suppressed when the inflammation has reached its height; there is only then exhaled a very small quantity of a thin viscid fluid, frequently more or less tinged with blood.

When the inflammation begins to abate, the secretion returns, becomes very copious, and assumes new characters and properties, having a striking analogy with the favourite hypothesis of *cocoon* of the ancients. In ophthalmia it is effused in considerable quantities on the surface of the conjunctiva under the appearance of a yellow opaque viscid fluid, distinctly globular, and still a little acid; it presents nearly the same characters in coryza. In acute bronchitis the expectoration, which consisted first of a thin mucus mixed with some albumen, now assumes the appearance of opaque, yellow, conglomerated masses, surrounded with some mucus, and constituting well formed sputa, such as were termed by the ancients *well concocted*. In diarrhoea there is a greyish, yellow, viscid fluid, containing small portions of coagulated albumen; in blennorrhagia a profuse secretion of a viscid opaque fluid of a yellow colour, inclining sometimes to green. All these secretions, when analyzed, separate into two principal fluids; one, of a milky colour and transparent, floats on the surface of water, or is suspended in it in small flakes; the other, which is of a greyish yellow, and presents all the characters of genuine pus, sinks to the bottom of the vessel. Puriform mucus floats on the surface of water, if the mucus preponderates; but if the pus be in larger quantity, it sinks to the bottom. In very severe inflammation the secretion consists of very little mucus, but almost entirely of pus, and the viscosity of the expectoration diminishes with the increase of the latter.

In chronic inflammations of mucous membranes, and especially in old catarrhs, if the inflammation is very moderate, the secretion is often purely mucous and not purulent; it sepa-

rates into two parts, one transparent, slightly viscid, and chiefly serous; the other more opaque, greyish, flaky, grumous, and consisting of pure mucus: it is sometimes streaked with black from the secretion of the bronchial glands. If an acute inflammation supervenes on the chronic, the expectoration becomes more thin, abundant, acrid, or frequently purulent, and does not resume its usual qualities until the inflammation abates. These exacerbations of old catarrhs are generally attended with great irritation. Profuse mucous or sero-mucous secretions of long standing must not be supposed always to indicate chronic inflammation, as they sometimes occur spontaneously by a mere increased activity of secretion. When, however, the secretion is both purulent and mucous, it is always a sure sign of the presence of inflammation either acute or chronic: profuse purulo-mucous discharges of this description occur sometimes in coryza, bronchitis, and colliquative diarrhoea, and are attended with considerable debility.

The alterations of the bronchial secretions in pneumonia are also striking and important. In the first stage of inflammation there is expectorated a white viscid frothy fluid, containing a good deal of saliva; it gradually acquires a yellow and then a green tint; its viscosity increases so much that it separates into two parts, the one a thin frothy fluid, the other a thick viscid ropy substance, which sinks and adheres to the vessel. About the third or fourth day the expectoration is often slightly tinged with blood, either uniformly or in streaks, and of a bright red or iron dusky colour; it has generally a saltish taste; the blood is, however, closely incorporated with the sputa, and not free, as in hemoptysis. The expectoration at this stage is found to contain mucus, albumen, and a certain proportion of fibrine, united with some of the colouring matter of the blood; it is the combination of albumen and fibrine with the mucus that renders the expectoration so plastic, adhesive, and ropy.

In the second stage of pneumonia, or that of red hepatization, the expectoration presents the same characters, only that the thinner fluid becomes also tinged with blood, which gives the whole expectoration a dirty pale-red colour; there is, however, a considerable decrease in its quantity. In partial and interlobular pneumonia the expectoration may continue purely catarrhal, or be only very slightly coloured.

In the third stage, or that of the grey hepatization, the secretions being suspended, there is for some time little or no expectoration; but as soon as the inflammation, having reached its height, begins to decrease, the expectoration returns. From being viscid, adhesive, and sanguineous, as described in the second stage, it becomes yellow, opaque, less tenacious, and also less tinged with blood; it sinks in water, and possesses all the characteristics of pus. As the resolution advances, the expectoration gradually becomes less purulent, and assumes again the plastic, viscid, sanguineous appearances of the second stage of inflammation; it then passes from this state to that of pure mu-

cus, until, on the complete restoration of the pulmonary function, it finally disappears.

The transition of the tenacious bloody expectoration into purulent can be very distinctly traced by dissection in the bronchial tubes of an inflamed lung. If the inflammation be arrested in the second stage by active treatment, the expectoration, instead of assuming a purulent character, loses its viscosity, becomes more sanguineous and very frothy: this change is favourable, as it indicates a more free admission of the air into the inflamed pulmonary texture, and an exudation of blood on the surface of the mucous membrane—a kind of bronchial hemorrhage, which tends to relieve the pulmonary congestion and inflammation. It is evident, therefore, that the formation of pus requires that the inflammation should have attained a certain height, and the blood have been submitted to a certain elaboration; this corresponds exactly with the notion of *coction* entertained by the ancients, which, however ridiculed by some, was founded on a correct observation of nature.

In chronic pneumonia the expectoration consists of thin transparent mucous fluid, and of a yellow purulent matter, which sinks to the bottom. In chronic catarrh and bronchitis we have already seen that the expectoration is sometimes purulent, but consists in other instances of mucus, more or less viscid or diluted. Purulent sputæ always sink in water; mucous sputæ sink in water when very thick and viscid, but float on the surface when thin and flaky, and pure pus floats on water when mixed with a large proportion of mucus.

It has thus been seen that in the inflammation of mucous membranes, the component parts of the blood undergo distinct changes, by which all the morbid phenomena can be explained as satisfactorily as in phlegmon. The serous portion of the blood, which has acquired increased coagulability, is exhaled with some of the fibrine, and frequently tinged with the colouring matter; the albumen of the serum, and the fibrine, supply the materials for the secretion of pus; and all these fluids are mixed in various proportions with the natural secretions of the membrane, which have themselves undergone certain changes both in quantity and quality.

The secretions of the skin experience corresponding alterations in inflammation. The skin, when inflamed, secretes at first a serous fluid analogous to the serum of the blood, but containing an increased quantity of albumen, which gives it a gelatinous appearance; as the inflammation advances, a portion of fibrine is added, increasing the tenacity of the secretion, and forming sometimes a plastic membrane. These changes may be observed in the bullæ arising from blisters, sinapisms, burns, &c. When the inflammation has reached its acme, the gelatinous layer becomes more dense and friable, acquiring a yellow opaque colour, and all the properties of pus. In chronic erythematic affections the pus is sometimes greenish, tinged or mixed with pure blood. The secretions of the inflamed sebaceous glands are sometimes incorporated with the sero-albumi-

nous or purulent fluid, giving it a peculiar fetid odour, varying in different parts of the body. It is by the concretion of these various fluids that the scales and crusts of cutaneous diseases are formed, as observed in herpes, tinea, psoriasis, &c. and it is also from the sebaceous matter that these crusts derive their peculiar odour.

The changes which the blood undergoes in inflammation, and its mode of conversion into pus, are the same in all textures; the intimate composition of the pus is also identical in all, presenting only such modifications as necessarily arise from the character and degree of intensity of the inflammation, and from the intermixture with other fluids. As the composition of the pus and its various modifications will be more fully considered in the section *Suppuration*, we shall only remark that its globular appearance, and its being composed chiefly of albumen and fibrine, are striking proofs, in addition to those already advanced, of its being derived immediately from the blood.

The exudation, in the inflamed part, of coagulated blood or lymph, and of other materials more or less concrete, proves sometimes so completely critical, that the inflammation subsides, leaving the swelling behind it. The inflammatory products may then remain in the part for a considerable time without undergoing any change, constituting various forms of induration and infiltration. These swellings may at a later period terminate by absorption or suppuration, or else take on some form of specific and unhealthy inflammation, such as the cancerous, syphilitic, scrofulous, &c. The dispersion of the inflammatory deposits without suppuration is partly accomplished by the impetus of the current of the blood gradually removing the cause of obstruction from the clogged vessels, and partly by interstitial absorption, as already stated in describing the phenomena of resolution.

It is important to remark that, besides the tumefaction resulting from the deposit of *morbid* products, inflammation, when much prolonged or often repeated, causes sometimes an enlargement of parts, by exciting an exuberant action of the nutritive powers, and a consequent excessive nourishment termed *hypertrophy*; there is in this case merely an increased activity of the healthy functions, and a preternatural enlargement of the healthy structure, without the occurrence of any morbid process, or the production of morbid deposits. Hypertrophy is more frequently induced by chronic than by acute inflammation. On the other hand, one of the frequent effects of inflammation, as already stated, is to interrupt the healthy functions of a part; it may cause in this manner a waste of parts from deficient nourishment, and reduce them to a state of *atrophy*; this is more generally a consequence of acute inflammation. These opposite results of inflammation are sometimes observed in parts composed of different structures; an exuberant nourishment of one tissue is generally attended with a deficient nourishment of the other tissues of the same organ. We some-

times see a considerable thickening of the investing membrane of an organ, and a wasting of the substance of the organ itself.

The nutritive powers may not only deviate from the healthy standard by being increased or diminished, but are sometimes also perverted; and this leads to *transformations* of texture. One tissue may thus be changed by a mere aberration of nutrition into a structure corresponding exactly with some of the tissues already in existence in the body, such as bone or cartilage; and these transformations are called *analogous*. But parts that have been long exposed to chronic inflammation frequently acquire a new structure in consequence of a vitiated nutrition, totally different from any in the healthy body; and these transformations are called *non-analogous*. They give origin to a variety of tumours, simple or compound, hard or soft, benign or of a malignant nature. Acute inflammation generally lessens the cohesion of tissues, and often reduces them to a remarkably pulpy state, by a peculiar process termed *softening*. Chronic inflammation, on the other hand, has a greater tendency to cause parts to become indurated. There are many exceptions, however, to these rules. Softening and induration are sometimes combined in the different textures of the same organ; but we must refer to the articles *INDURATION*, *SOFTENING*, *HYPERTROPHY*, *ATROPHY*, for fuller details of these important changes.

When the sensibility and vascular action of a part are so completely destroyed that all vital motion ceases, the dead animal tissues are soon affected with putrefaction, and this constitutes what is termed mortification. When this occurs as the direct effect of inflammation, it is to be attributed either to its excessive violence causing the rupture of a great many vessels and a considerable extravasation of blood, or to the nature of the exciting cause, or to some obstruction of the circulation. We shall not, however, enlarge here upon this and some other effects of inflammation, such as ulceration, effusion, &c. as our only object in this section is to describe those morbid changes which are best calculated to illustrate the theory of inflammation, so as to enable us to define it accurately from all other morbid actions. We must, therefore, refer the reader for further details to the articles *MORTIFICATION*, *ULCERATION*, &c.

Although the preceding changes of structure are frequently the consequence of inflammation, it is necessary to remember that they may occur without any inflammation: the preternatural growth of a part presupposes some increased action of its vessels, but this may take place within the limits of healthy action, and the increase of growth does not at all require that it should be carried to such an extent as to become morbid. It is obvious that atrophy is more likely to be the effect of deficient than of increased action; and both induration and softening are frequently seen to take place under the influence of debility rather than of irritation. A perverted state of the nutritive functions will sufficiently account for all transformations of texture, without the necessity of admitting any

increase of action; when they are attended with inflammation, this is much more generally to be considered as an ultimate effect of the irritation they have excited in the surrounding parts, than as an exciting cause; there is, however, no doubt that a state of long-continued irritation is one of the most powerful predisposing causes of these changes of structure.

It is important also to observe that many of the other common effects of inflammation sometimes occur without any inflammatory action: that increased secretions, effusions, hemorrhages, adhesions, suppuration, ulceration, and mortification may be the result of a state even opposite to inflammation, is a fact fully established by numerous pathological observations. There are numerous examples of large adhesions in the pleura in persons who had never experienced inflammation of the thoracic organs. Ulceration occasionally occurs in the skin and in the mucous membranes of the alimentary canal and of the throat, without any perceptible inflammation, and when the parts, on the contrary, are quite pale: this frequently happens also in scorbutus. Collections of pus are sometimes found in parts which do not exhibit the least trace of inflammation. Cases of this description, however, are of rare occurrence, and may be considered as exceptions to the general rule. The mortification of the extremities arising from ossification of the arteries is an example of its occurrence independently of inflammation; and we have occasionally instances of the same kind in gangrene of the lungs.

After inflammation and its consequences have been completely removed, the vessels of the part frequently remain weak, relaxed, and irritable, and greatly predisposed, therefore, to a return of the inflammatory action.

Besides the local effects resulting from the application of stimulants to a circumscribed part of the living body, of which we have given an account, they sometimes also excite perturbations in all the functions of the animal economy; this is illustrated by the following experiments, first performed by Kaltenbrunner, and which we have repeated. When a stimulant is applied to the web of the foot of a frog, in the course of a few hours all the symptoms of congestion, such as quickened circulation, increased redness, and slight tumefaction, are not only observed in the part first subjected to the irritation, but nearly to an equal extent also in the web of the other extremity. The irritation has, therefore, spread by sympathy to the whole circulating system, producing an increased redness and coagulability in the entire mass of blood, an increased activity and turgescence of all the vessels, analogous to that observed in the original point of irritation. In fact, a species of general congestion has taken place, constituting fever; this sympathetic fever subsides with the local congestion. If a very acrid and poisonous stimulant, such as a solution of muriate of mercury, be used, the following remarkable results occur:—signs of severe pain; great acceleration of the circulation in the webs of both feet; the globules of the blood, instead of a

vivid red, assume a dark brownish colour, and the blood shews a tendency to decomposition; the texture of the webs is tumefied, but rather pale; the skin of the whole body is pallid and covered with a thin mucus; after some time the vessels become less turgid; they contain but a small column of blood and are relaxed, their contractions continuing rapid but feeble. Small ulcers appear on different parts of the body, and the animal finally dies. In this instance we first see a local inflammation followed by sympathetic fever, and next the fever itself becoming the cause of secondary inflammation in various other parts of the body. The essential characters of fever are, therefore, increased quickness of the circulation, alterations in the quality and quantity of the blood, general turgescence of the blood-vessels, and, as aptly remarked by Kaltenbrunner, a species of inflammatory erethism. In secondary fever the local effects of stimulants are propagated to the whole vascular system, whilst primary fever itself may become the exciting cause of local inflammation.

The character of the fever may vary according to the previous state of the constitution, and the activity and nature of the stimulant. If a powerful stimulus be applied to a constitution in which there is a redundancy of rich blood and great activity in all the functions of life, the reaction will be strong, and the fever of a highly inflammatory nature. If, on the contrary, the mass of the blood be deficient in fibrine and red matter, and the vital powers low and little excitable, there will be less tendency to symptomatic fever. It has been observed that the lower animals are less subject to fever than the higher, but sink more rapidly under it. If there be a predominance of the nervous system, a great mobility of fibre and spare habit of body, the fever will be characterized rather by nervous irritability than great vascular action. If the irritating cause be of such a nature as to act chiefly on the nervous system, by first exciting and then depressing it, as is the case with various animal and other poisons, the fever will also assume an essentially nervous character. If a vitiated state of the blood and fluids be combined with an exhausted and irritable nervous power, we shall have the most formidable and pernicious kind of fever, characterized by an alarming combination of nervous and inflammatory symptoms: this is still more likely to occur if the exciting cause itself be of a depressing nature, such as animal and other poisons, the putrid matter of dissection, over-exertion of mind; depressing passions, &c. Finally, the exciting cause may operate on constitutions characterized by a specific morbid diathesis, such as the scrofulous, rheumatic, gouty, cancerous, &c.; in which cases the fever assumes a variety of well-defined modifications: all these varieties of constitutional fever will be more particularly considered in their proper place. (See *Constitutional Symptoms*.)

General inflammatory appearances of the blood.—Besides the various alterations in the composition of the blood that have been described

as occurring in local inflammation, the qualities of the entire mass of the blood are liable also to be affected in certain states of the constitution, which either predispose to, or are consequent upon, local inflammation; there is, it may be said, a general inflammatory condition of all the fluids of the animal economy, and this is especially true with regard to the blood, the inflammatory characters of which we shall proceed to describe.

When blood is drawn from an individual affected with an inflammatory disease sufficiently severe to disturb the constitution, the nature and appearance of the coagulum differ very materially from those of healthy blood; it contains a larger proportion of fibrine than healthy blood, and the fibrine at the top of the coagulum forms a layer of a yellowish white or slightly greenish colour, varying in thickness from less than a line to one or two inches; this layer has received the name of *size*, *buff*, or *buffy coat*; the surface of the coagulum is also frequently contracted, puckered up at the edges, and concave in the centre: the blood is then said to be *cupped*.

According to the researches of Hewson, Dowler,* Gendrin,† and others, the buffy coat consists of pure fibrine, deprived of the colouring matter, and mixed with a certain quantity of serum, which is found to contain much more albumen than the serum of the rest of the blood. There is a great analogy, therefore, both in appearance and in chemical composition, between the buffy coat of the blood, and the coagulable lymph that constitutes dense membranes. Besides the buffed and cupped appearances just described, the coagulum is in general of a greater density than in health, and less easily broken; it is firmly contracted and dry, in consequence of the serum being more completely pressed out of it, and it appears for this reason smaller in proportion to the quantity of serum; it has an ovoid truncated shape, and is frequently found floating in the centre of the vessel on a level with the serum. The cupped appearance, however, and the firmness both of the buffy coat and of the entire coagulum, are usually proportionate to the strength of the patient and severity of the inflammation, and are also greater in the inflammation of certain textures than of others, such as serous membranes, aponeuroses, tendons, ligaments, and other fibrous tissues. But it should be remembered that there is sometimes considerable firmness of the coagulum without any buff or cupping.

When the buffy coat is soft, the coagulum is less cupped, softer and larger, adheres to the bottom of the vessel, and contains more serum; the layer of buff is also thinner, and there is in reality a larger proportion of serum, although this may not be apparent at first, in consequence of its not being so completely separated from the coagulum; the blood is then sometimes described as being *sizey*.

Whenever there is an excess of the serous portion of the blood, the coagulum will be found soft.

The serum of inflammatory blood is also proved, by the researches of Dr. Trail and Gendrin, to be altered in quality, and to contain nearly twice as much albumen as in the healthy state. Gendrin has sometimes observed, especially in cases of chronic and suppurative inflammation, a *mucous layer* either at the bottom of the serum, or suspended in it like a cloud; the buffy coat in these cases was also of a more obscure white, less transparent, and softer.

The following are the appearances presented by the blood under different degrees of inflammation, according to numerous experiments made by Gendrin.*

In cases of very severe inflammation the blood coagulates rapidly. The buffy coat is thick, greatly cupped, firm and elastic; the coagulum has the form of an oval truncated at both extremities; it is dense and elastic (containing little serum), and floats on the surface of the serum, to which it bears the proportion, in point of volume, of one to one and a half, and sometimes two. The serum is viscid, colourless, and a little turbid at the bottom, but contains no colouring matter. In some rare cases of extreme inflammation, the proportion of serum is less than that of coagulum; the buff is very thick and dense, the coagulum adheres to the bottom of the vessel, where it is broader than at the top, having the shape of a truncated cone.

In cases of moderate inflammation the buffy coat is not so thick; there is little or no cupping; the coagulum is firm, cylindrical, and floats in a yellowish serum, equal in quantity to twice the volume of the coagulum; there is also a slight layer of colouring matter at the bottom of the vessel.

In sub-acute inflammation the coagulum may be slightly buffed, but more generally presents on its surface a layer of a bright red colour, and one or two lines in thickness; it is dense, slightly ovoid, and floats in the serum, although it sometimes either adheres to the vessel, or sinks to the bottom. The serum is viscid and limpid, but of a reddish colour at the bottom of the vessel, in consequence of the precipitation of some of the colouring matter; the serum equals in quantity at least twice the volume of the coagulum.

There may occur, of course, many modifications in degree between each of the preceding divisions; but this general outline will be sufficient to guide us in estimating the character of the inflammation, as far as we can depend upon the appearances of the blood.

It is important to notice that the blood may present all the inflammatory appearances just described, without the actual existence of any inflammation. Ratie and Belhomme ascertained by numerous experiments, that the blood of individuals in a state of sanguineous plethora was often buffed and cupped; this circumstance

* On the Products of acute Inflammation, by M. Dowler, Med. Chir. Trans., vol. xii.

† Histoire Anatomique des Inflammations, vol. ii. VOL. II.

* Op. cit. vol. ii. p. 430.

affords an additional proof, if any were wanting, that the general state of the blood may become a primary cause either of inflammatory fever or of local inflammation. The same inflammatory appearances are frequently observed also in pregnancy; the constitution of a pregnant woman bearing the closest analogy to the inflammatory diathesis, for the extraordinary increased activity of the circulation in the uterus borders on inflammation, and the general circulation of the mother is in a state approaching to symptomatic fever. The buffy coat has also been found in individuals who were in the habit of being bled, as a measure of precaution, at certain periods of the year.

The buffy coat and cupped-like form have been observed in the arterial blood during inflammation. Dr. Tweedie has seen it on two occasions; one was a case of inflammation of the chest, in which the temporal artery was opened in consequence of failure to procure blood from the veins; the other was a case of cerebral fever, in which blood was also taken from the temporal artery. Gendrin says that, on the only two occasions in which he opened the temporal artery, he observed a thin layer of buff, slightly coloured, on the surface of the blood.

The presence of the buffy coat may generally be considered as a correct indication either of the actual existence of inflammation, or of a strong predisposition to it; and when the obscurity of the other symptoms leaves any doubt respecting the inflammatory nature of a case, a buffed and cupped appearance of the blood will tend greatly to confirm us in the opinion of the disease being inflammatory. The degree of buffiness is not, however, in proportion to the danger of the inflammation; for, as already stated, in the inflammation of fibrous tissues, the blood is in general more intensely buffed and cupped than in that of vital organs. The absence of the buffy coat is not, on the other hand, to be taken as conclusive evidence of the non-existence of inflammation. We have seen that in sub-acute inflammation the buffed and cupped appearances are often wanting, and that they accompany the inflammation of certain tissues more constantly than that of others. In some inflammations of the mucous membranes, for instance, such as bronchitis, the blood frequently exhibits no buffiness or cupping. In weak or phlegmatic subjects also, whose blood is impoverished and whose constitutions are not very susceptible of sympathetic irritation, an important organ may be affected with dangerous inflammation, although the blood exhibits no indication of such a state of disease, and has, on the contrary, a dark red, jelly-like, and decomposed appearance. This has been observed in cases in which the inflammation has run rapidly to gangrene, or when the fever was of a typhoid character. It has also sometimes occurred in these cases, that when the typhoid symptoms have subsided, and the fever has assumed a more acute character, the blood has then become buffy. Whenever, therefore, there are other well-marked symptoms of inflam-

mation, we are not to attach much weight to the fact of the blood not exhibiting the usual inflammatory appearances.

The immediate cause of the formation of the buffy-coat is obviously the circumstance of the colouring matter of the blood beginning to subside before the coagulation is complete, so that the upper part of the coagulum loses its redness. There have been numerous speculations respecting the *remote* cause of the buffiness, none of which, however, can be considered as satisfactory. Hewson, Dowler, and some others, thought that the fibrine of inflamed blood became lighter; the latter states that he found the fibrine of the buffy coat to contain a larger proportion of serum, which, by diminishing its viscosity, facilitated the precipitation of the red matter. Hunter took an opposite view of the subject, conceiving that the red matter was squeezed out by the firmer coagulation of the fibrine: this is probably in part correct, as we find the coagulum of inflamed blood much firmer than in its healthy state. Hewson and other writers have also affirmed that inflamed blood coagulates more slowly than healthy blood, and that more time is thus allowed for the subsidence of the red particles. This opinion, however, is controverted by Dr. Davy and Gendrin; the latter maintains, as the result of many experiments, that the coagulation of inflamed blood commences sooner, and is completed more quickly than that of healthy blood. That the slow coagulation of the blood is not sufficient to account for the formation of the buffy coat is clearly proved, moreover, by some experiments related by Dr. Stokes, in his *Pathological Observations*. He made twenty-seven experiments, in fifteen of which a buffy coat was formed, and in the remainder it was wanting. No coagulation took place in three of the latter class of cases, in less than from twenty to forty minutes, and in four there was no coagulation for eight minutes; there was, therefore, ample time for the red particles to have separated from the fibrine; while in twelve out of the fifteen, in which there appeared a buffy coat, coagulation took place in five minutes, and was only delayed for fourteen minutes in the three others.

Although the comparatively slower coagulation of inflamed than of healthy blood cannot be admitted as the cause of its buffy appearance, it is nevertheless certain that every circumstance favourable to an *unusually rapid* coagulation of the blood has the effect of preventing altogether the formation of a buffy coat. These circumstances are principally the following: a narrow opening of the vein, so that the blood trickles down slowly in a small stream; being thus exposed to the cooling influence of the air, it coagulates almost instantly on reaching the vessel, so that there is necessarily no time for the separation of any of its constituent parts. We may sometimes account in this manner for the first cup not exhibiting any buffiness, while, if the blood is made to flow afterwards more freely, the buff may form in the second cup, in consequence of

its coagulating more slowly. The formation of the buffy coat may also be prevented or very much lessened by the blood being received in a flat vessel, and especially if cold; for by warming the same vessel so as to delay the coagulation, the buff has made its appearance. It is likewise prevented by letting the blood fall into the vessel from a height of three or four feet, or by keeping the blood for some time in a state of agitation, or by adding a solution of caustic potash.

The formation of the buff is, on the contrary, favoured by making the blood flow from the vein in a full stream, and by receiving it in a deep and narrow vessel. A narrow vessel is also the most favourable to the blood assuming the cupped appearance, which it very seldom does in broad and shallow vessels. Some have advanced that the mere acceleration of the circulation was sufficient to impart to the blood its inflammatory characters; but this is denied by others, and Sir Charles Scudamore says that he has never observed any buff in cases of simple fever, or after violent exercise.*

It is evident, therefore, that although the buffiness and cupped-like form peculiar to inflamed blood may be influenced in a certain degree by the various accidental circumstances just mentioned, these are wholly insufficient to account for this remarkable property, and that it must depend on some other cause with which we are unacquainted. The following remarkable facts would tend, however, to show that this property is immediately connected with some peculiar influence exercised by the vital powers of the system over the mass of the blood. The first cup of blood is often buffy, when the second is much less so, and the last one not at all. Now bleeding is frequently attended with an immediate diminution of the violence of the inflammatory symptoms, even while the blood is flowing; and the rapid change in the appearance of the blood may therefore be justly attributed to the amendment in the state of the patient. If at the end of some hours the inflammatory symptoms increase, and blood be again drawn, it will be found to have re-assumed the buffy appearance. Gendrin has observed on several occasions, that if blood was taken immediately after recovery induced by syncope, it not only had lost its inflammatory character, but that the clot was much softer; and the effect of syncope in rapidly subduing the inflammatory diathesis is well known. We have already stated that the fibrine is more abundant in inflamed than in healthy blood; it has been found, moreover, that the quantity of fibrine varies with the buffy appearance in the different cups, the blood of the first cup containing more fibrine than that of the second, so that the relief afforded by the bleeding is attended also with an immediate change in the proportions of the constituent parts of the blood.

In some diseases of debility in which the blood and other fluids are greatly vitiated, the blood is often extremely deficient in colouring

matter, and the coagulum appears of a dirty yellow or greenish colour. This must not be mistaken for the buffiness of inflammation, from which it will easily be distinguished by the great softness of the coagulum, turbidness of the serum, and general dissolved appearance of the blood.

Uses of inflammation.—Inflammation may generally be considered as a salutary process, instituted by the powers of the constitution, or the *vis medicatrix nature*, for the purpose of preventing, repairing, or removing the consequences of injury and disease; but, like all other salutary efforts of the system, it not unfrequently becomes a source of serious injury, and leads to fatal results, in consequence either of its excessive violence, or of the importance of the part affected.

The salutary effects of inflammation in *preventing* more serious disease is well illustrated by the process of adhesion. When an opening is made in any of the hollow viscera, either by ulceration or violence, the escape of their contents into the surrounding cavities is likely to prove fatal by exciting violent and very extensive inflammation. This, however, is frequently prevented by a slight inflammation set up spontaneously on the outside of the organs, and near the edge of the ulcer or wound; coagulable lymph is effused, and firm adhesions are thus contracted between the opening and the surrounding parts. Adhesive inflammation is often useful in preventing the spreading of disease, as, for instance, of suppuration or ulceration. Both adhesive and ulcerative inflammation assist materially in the removal of foreign substances or collections of matter, which are deeply seated; thus, in cases of hepatic abscess, there are sometimes firm adhesions first contracted between the liver and the large intestine, or the stomach, and then a passage is opened for the pus, by a process of ulceration, into either of these organs, and its escape into the cavity of the abdomen, which would inevitably prove fatal, is thus effectually prevented. A similar process attends the pointing of all abscesses of internal organs towards the parietes of the cavities in which they are contained, and the passage also of foreign substances through important parts of the body.

The advantages of inflammation in *repairing* the effects of injury or disease are illustrated by the re-union of divided parts, and the restoration or reproduction of some which have been partially destroyed, as is the case with bone, skin, cellular membranes, and vessels; there are structures, however, such as the nervous, muscular, and fibrous, which are not susceptible of being reproduced.

When the consequences of injury or disease are to be *removed*, this is effected either by suppuration, ulceration, or increased secretions. When a part of the body has become useless and injurious in consequence of mortification, and when the mortification has a tendency to spread, this is prevented, and the separation of the living from the dead parts effected by a circle of inflammation being excited at their point

* Elliotson's Lectures, Med. Gaz. Dec. 3, 1831.

of contact, which is followed by a gradual process of ulceration, whereby the dead parts are completely cast off.

When, after severe injuries, parts have been so much lacerated and contused that reparation becomes impossible, they are removed by suppurative inflammation. Suppuration is also sometimes of use in the removal of noxious substances and of foreign bodies; this may likewise be effected by increased secretions, or by the effusion of lymph, which afford relief, moreover, by sheathing and protecting the parts from the action of the irritating cause.

Inflammation is sometimes excited spontaneously in various parts of the animal economy, independently of any external cause, for the purpose of getting rid of some noxious or infectious matter which irritates, oppresses, or otherwise disturbs the operations of life; as is exemplified in the exanthemata, in several forms of fever, &c. We see, therefore, that various modes of inflammation are excited, according to the particular object that is to be obtained.

It is evident from the preceding considerations that inflammation is the most frequent of all diseases; it may exist singly, but is often combined with other diseases. When excited for a beneficial purpose, it is always susceptible of assuming a dangerous degree of violence, and this often depends on the state of the constitution. It frequently, however, occurs as a morbid process, not intended to answer any salutary end; and when it affects certain parts, such as vital organs, it is the most dangerous of all diseases.

Congestions.—The morbid phenomena of the second stage of the inflammatory process, which we have described under the name of active congestion, occur in a variety of important diseases which run their course without passing into inflammation, for which, however, they have not unfrequently been mistaken. Some melancholy instances of the injury done by the adoption of a violent course of treatment in congestive affections, in consequence of their having been erroneously considered as inflammatory, have come under our observation. We think it, therefore, desirable to devote a separate section to the consideration of congestive diseases.

The important distinction between inflammation and congestion was clearly defined by the celebrated Laennec in his admirable discourses on the practice of physic delivered at the *Collège de France*, in which he devoted several lectures to the consideration of congestive affections. This distinction has also been kept prominently in view by Andral in his excellent *Pathological Anatomy*, and especially in the section *hyperæmia*, to which we have been indebted for material assistance in this division of our subject.

Between the slightest increase of vascular action and that which constitutes decided inflammation, there are many intermediate degrees. Some of these are so slight and momentary that they do not interrupt the healthy

actions of the part, and may be considered as physiological; such as the flushing of the cheek produced by moral emotions, &c. But in many diseases characterized by disturbance of the functions of nutrition, secretion, or innervation, there is a state of congestion more or less active, which is truly pathological. A congested state of the liver, lungs, or any of the secreting surfaces, may be attended either with a suspension or excessive flow of their secretions. Congestion at the origin of the nerves, in the brain or spinal marrow, is frequently the cause of a variety of nervous affections; it may also be induced by long-continued nervous irritation of the brain itself. A sudden congestion in some organs may be the cause of instantaneous death, as in sanguineous apoplexy and spontaneous hemorrhages. Many of these diseases, although attended with very serious disturbance of the general health and considerable suffering, leave behind them no trace whatever of any change of structure, or else appearances only of an increase of vascularity, quite inadequate to account for the severity of the symptoms. It is evident, therefore, that there is a state of increased activity of the circulation, not amounting to inflammation, which may become an extensive source of disease; and we think this state may be appropriately distinguished from true inflammation by the name of *congestive irritation*. The study of this morbid condition is of considerable importance; for besides constituting of itself an important class of diseases chiefly *functional*, it may lead to inflammation, and lay a foundation for the development of many *organic* diseases; so that it may almost be laid down as an axiom in medicine, that diseases of function always precede diseases of structure. It should be remembered, however, that these morbid actions are closely linked together, passing by imperceptible gradations into each other; and that it is often as difficult to draw the exact line of demarcation between the healthy and pathological species of congestion, as between the latter and inflammation.

Congestive irritation may be more particularly limited to the arteries, the veins, or the lymphatics. Arterial congestion occurs most frequently in children, and venous congestion in old people. The scrofulous diathesis is peculiarly subject to congestive irritation of the vessels and glands of the lymphatic system. The vessels carrying only the colourless or serous portions of the blood, and those destined to the function of secretion, may be affected with congestive irritation as well as the vessels containing red blood, as is seen in sudden attacks of diarrhœa, cholera, &c. Congestions, however, may also occur without previous irritation, depending on debility of the vessels, mechanical obstructions to the circulation, or some alteration in the qualities of the blood. Congestions may, therefore, be divided into active, passive, and serous.

Active congestions.—These may be the effect, as already stated, of a primary irritation either of the nervous or vascular system, or of both con-

jointly: they are characterized by various degrees of increased activity of the circulation; injection and enlargement of the minute vessels; slight tumefaction, and in certain textures, redness, pain, and heat. Or when the congestion is very considerable, there is a languid oppressed circulation from over-distention. Active congestions differ, however, from inflammation, as already stated, by the circumstance of there being no rupture of the vessels or extravasation of blood, no exudation of coagulable lymph, formation of new products, or decided change of structure. Almost every part of the body may be affected with active congestion, but it is of most frequent occurrence in organs of a highly vascular structure, or having numerous direct communications with the heart and large vessels. We shall briefly notice the effects of active congestion in some of the principal organs.

In the brain, which it is obvious must be greatly predisposed to active congestion, it may occasion severe headache, delirium, drowsiness, vertigo, convulsive and other nervous affections; and it may lead to apoplexy, meningitis, or encephalitis: these symptoms are the result either of the stimulus of an excessive quantity of blood, or of its pressure on the cerebral mass and origin of the nerves. The cause of the congestion may not be seated in the brain, but depend on its morbid sympathy with some other organ, or on the general state of the circulation.

The lungs are perhaps more liable than any other organ to be affected with active congestion either of their parenchyma or mucous membrane. This is a frequent source of embarrassed breathing, and of a variety of other symptoms of pulmonic irritation; as, for instance, the dyspnoea attending asthma, chronic suffocative catarrh, and diseases of the heart. There are many other circumstances capable of causing a sudden determination of blood to the lungs; it sometimes happens that while portions of the lung are engaged in chronic inflammation, the rest of the organ is in a state of congestive irritation. Active congestion is one of the frequent causes of hemoptysis.

Congestion of the heart and adjoining large vessels is of frequent occurrence; any obstruction to the circulation from organic disease in the lungs, brain, or large vessels in the neighbourhood of the heart, or any circumstance repelling the blood from the surface and extremities of the body towards the centre, must necessarily cause it to accumulate in the heart; and this may induce either symptoms of quickened and irregular, or slow and oppressed action. Organic disease of the heart is also a frequent consequence of a long-continued state of congestion.

There are many hepatic affections depending on a state of congestion of the liver, not amounting to inflammation. The great vascularity of this organ, and the peculiarities of its vascular system, consisting of a large proportion of veins in which the blood circulates slowly, greatly predispose it to congestion. The majority of hepatic diseases in this climate are

functional, the liver not being so subject to active inflammation as in tropical regions. A congested state of the liver sometimes causes sudden jaundice by obstructing the biliary canals; at others it gives rise to an excessive flow of bile, which is ejected by vomiting or diarrhoea, as in cholera; in some cases it has been followed by ascites, an unusual quantity of blood being thrown into the vessels of the peritoneum, in consequence of the obstruction of the branches of the vena portæ. Some remarkable cases of this description have fallen under our observation, and they have in general yielded readily to an appropriate treatment.

The great extent of the mucous surface of the alimentary canal, its high vascularity, and numerous sources of irritation, sufficiently account for its being frequently the seat of active congestion. The pathology of these viscera, which was for a long period almost entirely overlooked, has been diligently investigated of late years, and its general importance fully established. The influence of a partial congestion and inflammation of this membrane in many diseases, and especially as the proximate cause of continued fevers, has, however, been much overrated. It is particularly with respect to these organs that some pathologists have frequently described appearances as inflammatory, which belonged only to the increased vascularity of active or passive congestion. We have sometimes seen, whilst on the continent, patches of mere redness and injection found in the stomach or intestines, noted down as decided inflammation by disciples of Broussais.

Continued and intermittent fevers, and some of the exanthemata, are generally attended with congestive irritation of several of the internal organs, which sometimes assumes the character of sub-acute, and more rarely of active inflammation. Various degrees of vascular injection and redness are often found in patches in the stomach and intestinal canal of patients who die of fever. In the yellow and some low forms of fever, characterized by violent and irregular determinations of blood, large portions of the mucous membrane present sometimes a uniform dark injection, and the patients in the last stage of these fevers frequently discharge blood by the mouth and anus. The hemorrhagic affections of the alimentary canal, such as hematemesis, melæna, the hemorrhoidal flux, are usually preceded by some degree of congestive irritation, which seldom amounts to inflammation. In melæna the congestion, however, is in general rather passive than active. There is often an unusual quantity of blood forced into the vessels of the alimentary canal in diseases of the heart and liver, giving its mucous coat a highly injected and uniform red appearance: the same may occur when the last struggles of life are violent and much prolonged, but in these cases the congestion is also frequently passive.

The uterus is always in a state of congestion at the approach of the menstrual period. This organ is peculiarly subject to congestive as well as nervous irritation, which sometimes leads to profuse hemorrhage. The morbid

irritations of the uterus exercise a most powerful influence over all the other functions, and especially those of the nervous system. The kidneys are affected with congestive irritation in some cases of hematuria, especially after scarlatina: the only morbid appearance these organs present in diabetes is a dilated and injected state of their bloodvessels. The spleen is frequently found excessively distended with dark blood after continued and intermittent fevers.

We have well characterized instances of active congestion of the skin in a variety of cutaneous diseases. Erythema and erysipelas may be considered as holding a middle station between active congestion and inflammation, presenting the characters of the former when mild, and of the latter when severe. Petechiæ sometimes depend on congestive irritation, though they seem more generally connected with a passive condition of the vessels. The mucous membrane of the nose, mouth, and pharynx is often affected with active congestion: and there is in some individuals an habitual congested state of the pharynx and tonsils that greatly predisposes them to reiterated attacks of cynanche. Sudden congestion of the pharynx occurs also sometimes in hysteria. Several diseases of the bones, such as necrosis, extensive caries, spina ventosa, are occasionally attended with great vascular congestion and profuse hemorrhage. This is also the case with cancer, fungus hæmatodes, erectile, and other tumours.

The preceding general, though imperfect, sketch of some of the principal varieties of active congestion is sufficient to shew that it is a pathological condition of extremely frequent occurrence, and that it includes a number of most important diseases.

Considerable vigour in the powers of life, a great development and activity of the vascular system, with a large proportion of rich blood, will no doubt strongly predispose to active congestions. They, however, frequently occur also in an opposite state of the constitution—one of great general debility. The irritability of both the nervous and vascular systems being considerably increased by weakness, very slight causes are then sufficient to induce severe local congestions. The nervous sympathy existing between the different organs has a remarkable and important influence in the formation of active congestions; the morbid irritation which attracts the blood to one organ is often transferred through the medium of the nervous system to other organs, and disturbs their functions. The occurrence of any considerable change in the circulation of one organ, either in excess or deficiency, frequently tends also to destroy the balance of the circulation in others, constituting in this manner a species of sanguineous sympathy; we accordingly find that a primary congestion is sometimes followed by secondary congestions in other organs, whilst it sometimes has a contrary effect in depriving other organs of their usual quantity of blood. Thus, in congestions of the mucous membrane of the alimentary canal, the skin may be either hot and red, or pale and cold; the brain either violently

congested, or in the opposite condition. The occurrence of these secondary congestions depends of course on the extent of sympathy existing between the several organs, and this accounts for many of the important combinations of symptoms in disease; as, for instance, the cerebral symptoms accompanying active congestions of the stomach and intestinal canal; the occurrence from a similar cause of paroxysms of asthma, or of disordered action of the heart. The morbid irritability of the uterus, either with or without congestion, is a most prolific source of active congestion in either the digestive, the respiratory, the circulating, or the cerebral organs, and gives rise to an endless variety of anomalous and distressing symptoms. A diminution in the usual quantity of blood, and a deficiency in the vitality of one organ, may also become, as before stated, the immediate cause of congestion in others; as, for example, the sudden suppression of the perspiration, or an habitually torpid action of the skin from long-continued exposure to cold and damp; the suppression of the catamenia; of the urinary or alvine excretions; the application of cold and wet to the extremities, &c. If any one organ is in a state of disease, or has previously been so, that organ has the greatest disposition to be affected with either primary or secondary congestion.

When congestion exists in several vital organs at the same time, there is often a combination of most dangerous and alarming symptoms, many of them, however, of a purely nervous character, and leaving no morbid appearances beyond very slight traces of increased vascularity in some of the organs. A secondary congestion has sometimes the effect of aggravating the primary disease, at others it supersedes it; and in some cases there are singular alternations of disease called *metastases*, as is often observed between the brain and the stomach, or the brain and the lungs. These irregular determinations of blood may be traced in a great measure to the influence of the nervous over the vascular system, and especially over the functions of the minute and capillary vessels, for they occur particularly in debilitated subjects, whose nervous system is highly susceptible, and endowed with great mobility: the just balance and harmony of the circulation is easily destroyed under this feeble and unsteady action of the nervous power; points of irritation are excited in various organs from the influence of slight causes, inducing a sudden, unequal, and temporary flow of blood towards these organs, and a consequent train of anomalous symptoms, frequently of a formidable description. It is remarkable how trifling a degree of local irritation and congestion is often sufficient under this state of weakness and irritability to cause violent pain, delirium, convulsions or syncope; this class of patients, moreover, very frequently exaggerate their symptoms. An incautious perseverance in very active remedies in such cases is only calculated to aggravate their condition; and it is often necessary to combine, in their treatment, moderate local depletion with the administration of tonics,

and to depend sometimes altogether on the restoration of the general strength. This important principle did not escape the attention of the great Hunter, for in the treatment of severe ophthalmia, in highly irritable constitutions, he often found bark and a generous diet more successful than depletion and purgatives. It should be observed, however, that long continued disturbance in the nervous action of an organ has a great tendency to induce active congestion, and lay the foundation of organic disease; and this important consideration should never be overlooked in the regulation of the treatment.

The state of the mass of the blood, both as to quantity and quality, is a very frequent cause of active congestion. There is sometimes a greater quantity of blood formed than is required for the purposes of life, and this creates a state of over-distention of the whole vascular system, a sort of general congestion called *plethora*. There is a tendency in some constitutions to make blood more rapidly and in greater quantity than in others; this is favoured by high living and little exertion either of body or mind. There is also a much greater natural development of the vascular system in some individuals, constituting the sanguineous temperament; and the blood is then generally rich in fibrine and red matter. This excess in the quantity and nutritive quality of the blood keeps the solids in a state of permanent excitement highly favourable to the development of active congestion and inflammation. When this excitement is carried to a considerable extent, it ceases to be healthy; every portion of the animal economy is stimulated into inordinate action; the functions both of the nervous and vascular system become generally disordered; the pulse increases in strength and frequency; the temperature of the body is raised; the secretions are variously modified; and all the symptoms of general fever, without any marked local affection, are developed.

This fever from plethora may be mild and soon subside, or else there may be a strong general reaction, giving rise to a variety of alarming symptoms, and sometimes to an apparent prostration of strength from oppression of the powers of life. When this form of fever terminates in death, the only morbid appearance to be discovered is a certain degree of congestion in the minute vessels of the different organs, without any one being more particularly affected than the rest. It has been very justly remarked by Andral, that since, wherever the blood is distributed, derangement of function is found, the first cause of the disease resides indisputably in the blood, the lesion of the solids being only secondary. That cases of fever exactly corresponding with the preceding description do sometimes occur, is a fact as well established by the concurrent testimony of many experienced pathologists, as any in medicine. We have had the opportunity of examining several hundred bodies of persons who have died of fever, and in some of these, although certainly but a small proportion, we have been unable to detect any

morbid appearance worth noticing; the assertion, therefore, of Broussais and his followers that fever is always the effect of a sympathetic irritation of the heart depending on the irritation or inflammation of some other part of the body, and that essential or idiopathic fever has no existence but in the imagination of some pathologists, is directly opposed to general experience. There are few, we believe, who would venture to deny that all the organs are sometimes found perfectly healthy in other acute diseases which have come unexpectedly to a fatal termination; and it may well be asked, why should not the same occur in fever?

A plethoric condition of the system is, however, most generally combined with a great tendency to accumulation of blood and active congestion in the different organs. When the brain is thus affected, a variety of cerebral symptoms, such as have already been described, may manifest themselves, and even a fatal termination be the result, without leaving any other trace of disease than a highly injected state of the vessels. The congestion may more particularly affect the thoracic organs, and occasion distressing symptoms of dyspnoea, cough, palpitations, &c. The digestive and hepatic viscera are very frequently the seat of active congestion from plethora, in which case the digestion may be impaired, the secretions increased or vitiated, and indirect debility induced by the oppressed action of the different organs. It is justly observed by Dr. Barlow, in the article CONGESTION OF BLOOD, that this condition of the system has often been mistaken for common dyspepsia, and a more formidable and permanent disease been excited by the adoption of a tonic course of treatment; whereas, if the mass of the blood be diminished, and the vessels unloaded by means of venesection, by remedies tending to increase the secretions, and by abstinence, the oppressed organs soon recover their free action. The kidneys, uterus, and cutaneous surfaces may be similarly affected, and a natural cure sometimes takes place by spontaneous hemorrhage. The ancients were well acquainted with this state of the system, and were by no means in error when they laid it down as an established pathological principle, that many acute and chronic diseases, especially of the digestive, hepatic, and excretory organs, were to be considered as critical efforts of the constitution tending to rid it of various sources of oppression or irritation, and to re-establish the just balance of the functions. The late Mr. Abernethy has accurately pointed out the great importance of attending to this principle in the treatment of surgical diseases, and he is on this account justly entitled to the merit of having introduced a new era in this department of pathology.

A state of great obesity induces sometimes a form of plethora more dangerous, perhaps, than any other in its consequences, and more difficult to obviate. When a great quantity of fat is deposited under the skin and round important viscera, the small vessels become so com-

pressed that the blood necessarily accumulates in the heart and larger vessels, in which case those organs destitute of fat, such as the lungs and brain, are often oppressed by excessive plethora, and strongly predisposed to active congestion; the action of the heart itself is frequently impeded by the mass of adipose substance surrounding it, and its muscular tissue is even sometimes partly converted into fat: this condition of the system is generally characterized by an extremely embarrassed, slow, and irregular circulation, and great disorder in the functions of the brain, lungs, and heart; in one instance we observed the pulse frequently so low as 28 in a minute, and it never rose to 40.

There may be an habitual excess of blood in one organ, a state of local plethora, whilst the other parts of the body have even less than their natural quantity. This may be the effect of natural conformation. When the thorax is narrow or deformed, the lungs are compressed, and the circulation through them is so impeded that a slight acceleration of the action of the heart will be sufficient to cause an accumulation of blood in their texture. The same may occur in the brain when the head is small in proportion to the size of the trunk, and especially of the thorax. Large men with a small head and short neck often suffer severely from cephalic affections, especially when the heart was large and its action naturally vigorous; on the other hand a very large head and contracted chest may be attended with the very same result, especially in children: in fact any great disproportion in the natural development of different parts of the body, must necessarily predispose to unequal distributions of blood, and this is one source of those peculiarities of constitution termed idiosyncrasies.

Plethora may exist more exclusively either in the veins or arteries; and this difference is in a great measure connected with the period of life. The arterial system being most developed and in greater activity in childhood and youth, active arterial congestion is most common at these ages. As the rigidity of the solids augments with age, the arteries in particular acquire a greater degree of density, and a great number of the minute arteries become obliterated; a larger quantity of blood is consequently thrown into the veins, whose coats offer less resistance than those of the arteries; and the venous system becomes in this manner gradually more distended with blood towards the decline of life, and more liable to be the seat of congestion.* The different periods of life are characterised also by a greater tendency to plethora and active congestion in certain organs than in others; thus, in childhood and youth the brain and thoracic viscera are principally affected, the abdominal viscera in adults, and the brain and abdominal viscera in old age.

Local plethora may be the result of habits

of life and modes of employment. Intense study creates habitual plethora in the brain; occupations requiring a low position of the head and great straining of the sight produce a similar effect. The people employed in Italy in the manufacture of mosaics suffer greatly on this account from congestive and inflammatory affections of the brain and eyes; and the same is observed in a variety of other trades. The seasons and climates exercise a considerable influence over the distribution of the blood. Heat stimulates the activity of the circulation, and creates a tendency to plethora in the skin and superficial parts of the body during spring and summer, as is shown by the prevalence of the exanthemata and other cutaneous affections: this is likewise the case in tropical climates, where some cutaneous affections assume a highly inveterate character. Excessive heat is known also to create a strong predisposition to hepatic congestions and disordered biliary secretions. The application of cold to the surface lowers the activity of the circulation, and repels the blood towards the centre; and hence the great tendency to congestions in the lungs, brain, and mucous surface of the alimentary canal, during winter and in cold climates. The sudden exposure to intense cold has often been instantaneously followed by an attack of apoplexy: the influence of variations of temperature is greatly increased by their occurring suddenly. These changes in the circulation are not the effect merely of the heat of the atmosphere, but also of the different degrees of pressure it exercises on the body according to the variations in its density. Thus, a condensed, pure, and cold atmosphere adds by its pressure to the power of the solids to resist the impulse and distension of the fluids; and the quantity of blood on the surface of the body being thereby lessened, a certain degree of *internal* plethora is the result: whilst in a heated, rarefied, damp, and impure atmosphere, the vessels of the surface being subjected to less pressure, are more relaxed, admit a larger quantity of fluids, and there is a consequent tendency to *external* plethora.

Some ancient pathologists conceived that there were certain conditions of the body independent of the effect of heat and cold, which give rise to alternate states of condensation and rarefaction of the fluids, and which they referred to some particular influence of the nervous system. They explained in this way various sudden congestions whose occurrence could not be traced to any irritation or mechanical cause; they accounted in the same manner for the great extrication of gaseous fluids observed in some nervous diseases, such as hysteria. The motions of the fluids, and their degrees of rarefaction and density, have been supposed by some modern pathologists to be partly regulated by electricity; but these speculations, however interesting, do not yet appear to rest on sufficient evidence to be applied to practical purposes.*

* See the *Physiological Speculations* of Sir Clifton Wintringham; Cullen's *Nosology*, book iv. chap. 1.

* See the researches of Dr. Reuss of Moscow, published some years ago; the more recent experiments, also, of Dutrochet in France, and Faust and

The last of the causes of local plethora to which we shall allude is of a mechanical nature,—that arising from tight bandages habitually worn over different parts of the body. Every medical man must have had numerous opportunities of witnessing the highly injurious consequences of this pernicious practice, especially in women; they are too obvious to require further illustration.

The introduction into the animal economy of a contagious virus or of any other deleterious principle, such as putrid miasmata, &c. has generally the effect of exciting congestions more or less active in several organs at the same time, as is observed in a number of infectious diseases, such as measles and scarlatina, typhoid and malignant fevers; or after the administration of poisons. These deleterious principles vitiate the qualities of the blood, disturb the whole nervous system by either irritating or depressing it, and thus create active congestions in the brain and alimentary canal.

One of the frequent terminations of congestive irritation of the bloodvessels is hemorrhage, either within the texture of the part affected, or on its surface. When there are no means of escape for the blood, the consequences are often extremely dangerous; as in apoplexy, and likewise in hemoptysis, when the blood is only partially expectorated, and a portion retained within the pulmonary texture. Where, however, the blood can issue freely, the hemorrhage frequently relieves the congestion, as in epistaxis, hematemesis, menorrhagia, &c. This timely hemorrhage often prevents the congestion from passing into inflammation; whilst the repression of the hemorrhage, whether spontaneously or by artificial means, has been sometimes immediately followed by formidable symptoms of inflammation. Hemoptysis has in this way been converted into pneumonia; hematemesis into gastritis; menorrhagia into metritis. The hemorrhage may also prove hurtful by causing an excessive loss of blood, either in one or successive attacks; there is a great tendency to hemorrhagic action in certain constitutions, depending most probably on some condition of the bloodvessels leading to congestive irritation; other constitutions being more predisposed to serous effusions. It should be observed, however, that hemorrhage may occur without any previous congestion of the bloodvessels, either active or passive, the parts after death not presenting the slightest morbid appearance; this must be owing to some modification in the texture of the parietes of the vessels, or to some peculiarity in the qualities of the blood; as, for instance, when reduced to a thin watery state, so that it escapes from the vessels as fast as it arrives. This species of hemorrhage is observed in scorbutus and in the hematuria of old age.

Inflammation is one of the most natural and important consequences of congestive irritation.

The development of many formidable diseases may be prevented if the congestive stage of the inflammatory process can be removed by the timely application of appropriate remedies. Active congestions are sometimes only temporary, and quickly subside: when of long duration, they frequently occasion various alterations in the nutrition and secretions of the part, which they either increase, diminish, or vitiate. They sometimes assume an intermittent and periodical character, as in some forms of cephalalgia, dyspnoea, &c.

Passive congestions.—It has been already stated that congestions are frequently formed without any previous irritation or increased activity of the circulation, and that they may be the effect of a relaxed state and deficient activity of the vessels, of a vitiated condition of the blood, or of some mechanical obstruction to its course: in these cases the congestion is termed *passive*. Passive congestion is characterized by various degrees of redness and sometimes tumefaction, but is distinguished from active congestion by the absence of pain and heat.

The accumulation of blood in the passive congestion sometimes becomes a source of irritation, and the congestion then assumes an active character. On the other hand, a congestion, which was at first active, may after some time become passive. There are, therefore, two forms of passive congestion, the one *primary*, and the other *secondary*.

The principal causes of passive congestion, viz. relaxation of the small vessels, languor of the general circulation, and a thin vitiated state of the blood, are combined in the scorbutic constitution; there is consequently a remarkable tendency in scorbutus to passive congestions and extravasations of blood in all vascular textures. In cases of general debility of the powers of life, and deficient energy of the capillary system, the blood has the greatest tendency to accumulate in those portions of the vascular system the most remote from the propelling influence of the heart, and in which the circulation is chiefly carried on by the contractility of the extreme vessels; and this is still more likely to occur where the blood in its passage from the capillaries into the veins has to overcome the force of gravitation. The lower extremities of old people are sometimes affected, owing to the operation of these causes, with spots presenting an injected, dark-red, marbled appearance, sometimes varicose or in a state of echymosis.* In some cases there is a complete stoppage of the circulation, stagnation and coagulation of the blood; the vitality of the part is destroyed; it becomes cold and insensible; assumes a dark livid colour; and a form of gangrene frequently supervenes, called the *gangrena senilis*. A similar affection is of frequent occurrence in certain forms of fever, and other diseases attended with great nervous debility and a vitiated state of the blood; the application of any slight irritation to the skin, especially in the dependent parts of the body on

Mitchell in America, on the endosmosis and exosmosis of fluids and gases.

* Andral, op. cit. vol. i. p. 50.

which the patient lies, such as the back, sacrum, and nates, is followed by the appearance of red patches of congestion; these, at first acute, soon become passive, and assume a gangrenous appearance.

All the internal organs are subject to passive congestion. When death is attended with violent struggles, as is the case from the convulsions of tetanus, of asphyxia, by strangulation, or from the effects of certain poisons, many of the internal organs, and particularly the brain, are found loaded with blood, and more or less injected. When after protracted diseases death occurs very gradually, the lungs are sometimes found gorged with blood and serum, although there was no previous symptom of pulmonic affection. These changes occur more particularly in the posterior portion of the organ, when the patient lies constantly on the back. They can only be referred to debility of the capillaries and passive congestion, as they were not preceded by irritation. After the inflammation has been subdued in acute pneumonia, and convalescence is established, there remains in some cases a certain degree of dyspnoea and crepitating rhoncus, although the thorax has recovered its natural sound on percussion, and these symptoms resist the continuation of antiphlogistic remedies, whilst they yield readily to the employment of tonics. The congestion of the bronchial membrane in chronic catarrh frequently requires a tonic plan of treatment, and it may be fairly concluded in both these cases that the vessels are in a relaxed and passive condition.

There is a great predisposition to passive congestion in the mucous membrane of the alimentary canal. This is not surprising when we consider how largely it is supplied with bloodvessels, their subdivision into numerous arches supported only by a loose membrane, and, above all, the peculiarities of its venous circulation; for the venous blood of the alimentary canal being distributed to the liver by veins deprived of valves, the slightest obstruction to the circulation of that organ, which is naturally slow, must have the effect of retarding the return of blood from the intestines, and creating an accumulation in their venous system. This accounts for the frequency of hemorrhoidal affections, diarrhoea, and dysentery, in chronic affections of the liver. In fevers of a low, nervous, and malignant type, the mucous membrane of the intestines, and chiefly of the colon, is sometimes found of a uniform dark-red colour, turgid and soft, in consequence of an intense venous injection of a passive character, the black pitchy secretions of the membrane resembling decomposed venous blood.* In a case of this description the mesentery was covered with large dark-red blotches, giving it the appearance of a leopard's skin, and arising from a state of intense injection of the mesenteric veins with extravasation of blood, the congestion having fallen on

the mesentery instead of the coats of the intestines. The mucous membrane presents frequently similar appearances in melæna; and in a case of recent occurrence we found it impossible to discover the least difference between the black sanguineous fluid contained in the intestines, and the blood taken from the vena portæ.

Mechanical compression or obliteration of any portion of the venous system is necessarily followed by passive congestion in all the parts whose blood is returned to the heart by the obstructed vessels. When this obstruction occurs either in the lungs or heart, it produces passive congestion in all the organs of the body. This is particularly well exemplified in asphyxia, in which the face becomes livid and swollen, the lips purple, the tongue tumid, the eyes red and staring, and the whole surface of the body injected with dark blood. The lungs, right cavities of the heart, and entire venous system are found distended with venous blood, whilst the left cavities of the heart are nearly empty; the mucous membranes of the lungs and alimentary canal are also deeply injected. When the obstruction in the pulmonary circulation takes place gradually, as in pulmonary consumption, the same general congestion is not observed, because the absolute quantity of blood in the whole system is diminished by long-continued imperfect sanguification, deficient nutrition, and increased excretions. A nearly similar state of general passive congestion is sometimes produced by diseases of the heart, whether congenital, as in the morbus cœruleus, or acquired.

Serous congestions.—The order of vessels which convey only the colourless or serous portion of the blood, are liable also, as before stated, to be affected with congestive irritation. These vessels exhale in health a sero-albuminous fluid or vapour, which constantly lubricates the areolæ of the cellular tissue, the cavities lined with serous membranes, the mucous and cutaneous surfaces, and, in fact, every part of the body. It can be satisfactorily shewn, by a variety of experiments, that this fluid is supplied by the serum of the blood. If, for instance, a solution of prussiate of potash be injected into the veins, it can be immediately detected in the fluid of the serous membranes by means of sulphate of iron.* Serous and sanguineous congestions are not unfrequently combined; the former may, like the latter, occur without previous irritation, and be passive.

Congestive irritation of the colourless vessels is generally followed by an increased exhalation of serous fluid, which is either retained in the areolæ of tissues and closed cavities of membranes, constituting different forms of effusion, or, when poured out on the mucous and cutaneous surfaces, is carried off in the form of increased excretions.

Those portions of the cellular tissue the texture of which is loose and the position dependent, are the most frequently the seat of serous effusions. The dense cellular tissue

* Dr. Armstrong made these congestions the foundation of one of his divisions of fever, which he termed *congestive*.

* Andral, op. cit. vol. i. p. 379.

lining mucous membranes is not, however, exempt from serous infiltration; the membrane is then raised, loose, and flaccid, as is well exemplified in that fatal disease, œdema of the glottis. When serous effusions occur in the membranes investing vital organs, they often give origin to various formidable and fatal diseases. The investigation of their causes is, therefore, deserving of some consideration. These causes may be divided into increased action of the vessels, debility of the vessels, alterations in the qualities of the blood, and mechanical obstructions to its circulation.

Serous effusions may take place from irritation and increased activity of the secreting vessels, without the cellular tissue or serous membrane undergoing any alteration of texture, or presenting even the slightest appearance of sanguineous congestion. If the irritation be slight, the effused fluid corresponds exactly in its composition with the serum of the blood, consisting of a large proportion of water (900 in 1000 parts), a small quantity of albumen (80 in 1000), and the remainder made up of soda, various salts, and an animal matter analogous to mucus.* Under certain circumstances not connected with irritation the effusion contains also a substance called extracto-mucus, either uniformly combined and giving it a slight turbid appearance, or floating in the midst of the fluid in small filaments or flocculi. As, however, the irritation increases, the proportion of albumen becomes considerably greater, and this substance is therefore a good test of the violence of the irritation. When the congestive irritation reaches the point of true inflammation, the disease is characterized by other morbid changes; there is an exudation of coagulable lymph and pus, which, being mixed with the serous fluid, gives it a turbid appearance; the surface of the membrane itself is lined with layers of lymph; its bloodvessels and those of the sub-serous cellular tissue are deeply injected, and blood is sometimes extravasated by their rupture. The absence, however, of any trace of vascular injection in a serous membrane, after effusion has taken place, must not always be considered as a sure proof that it never existed; for there may have been considerable sanguineous congestion in the first period of the disease, which has disappeared after the turgidity of the vessels has been relieved by the exhalation of the distending fluid. We accordingly often observe the symptoms of local and general irritation in acute affections of the cellular tissue and serous membranes, completely subside the moment the effusion has taken place; and we may frequently predict an accession of effusion by the return of these symptoms. It may, therefore, be received as a general rule that a state of congestive irritation, both of the sanguineous and serous vessels, especially when long-continued, is more favourable to acute dropsical effusions than active inflammation; that active inflammation is attended with a greater disposition to the formation of adhesions and false membranes, or to the exudation

of pus and blood, than to copious serous effusions, the function of secretion being rather suspended than accelerated during the inflammatory process. The fever and other constitutional symptoms which precede effusions into the cavities of the head, chest, and abdomen, are accordingly, in the majority of cases, rather of a sub-acute than highly inflammatory character; and it is extremely important to keep this circumstance in mind, as the mild and insidious nature of the symptoms has frequently concealed the real danger of the disease. Serous effusions take place also, no doubt, in the course of severe attacks of inflammation; but effusion is then almost always combined with suppuration and the formation of pseudo-membranes, and it generally occurs when the inflammatory action is on the decline. We have examples of this in pleurisy and peritonitis.

In recent cases the texture of the serous membranes is generally unaltered; but when serous congestion has been of long standing or frequent recurrence, the membrane becomes thickened and of an opaque white, in consequence of the infiltration of the serous fluid between its layers. A similar infiltration takes place into the subjacent cellular tissue, which on this account adheres to the membrane when raised, and increases its thickness; this happens more especially where the sub-serous cellular tissue is loose and abundant, as, for instance, between the arachnoid and pia mater. The free surface of the membrane loses also its smoothness and polish, becoming rough and granulated. In some severe and very protracted cases, the membrane is thickened and even cartilaginous, in consequence of vitiated nutrition. The serous fluid may be either colourless or of a green, yellow, or reddish tint, owing to the presence of a portion of the colouring matter of the blood; it is sometimes mixed with a yellow colouring matter analogous to that of the bile, and has in some cases been found to contain uric acid.

The effusion may be occasioned by a primary irritation of the tissue in which it is formed, or a secondary irritation propagated from a neighbouring part.* Hydrocephalus is in most cases to be attributed to irritation in the brain; ascites is sometimes consecutive to peritonitis; erysipelas, phlegmon, and all extensive and deep-seated inflammations, are attended with œdema of the adjacent cellular tissue. Effusions depending on congestive irritation are characterized by local and constitutional symptoms more or less acute; when they occur in the sub-cutaneous cellular membrane, as in œdema and anasarca, there is swelling and some degree of heat, pain, and tension; this corresponds with the diffuse inflammation described by the late Dr. Duncan. When the effusion takes place within any of the splanchnic cavities, or in the texture of important organs, there are a variety of local symptoms more or less severe according to the impediment occasioned in the functions of the organ. The constitutional symptoms vary con-

* Andral, op. cit. vol. i. p. 389.

* Andral, op. cit. vol. i. p. 393.

siderably, being sometimes violent, at others mild, obscure, and insidious ; this depends very much on the suddenness of the affection, as well as on idiosyncrasy, and other circumstances. A slight degree of congestion and effusion occurring suddenly may give rise to very violent symptoms and prove rapidly fatal ; whilst a higher degree of congestion, and the effusion of a larger quantity of fluid, if it only take place gradually, is sometimes attended with comparatively little inconvenience, there being time for the parts to accommodate themselves to the distention occasioned by the fluid.

The following enumeration of the diseases in which effusion occurs as a consequence of congestive irritation of the serous vessels, will shew the importance of attending to this species of diseased action. It affects both sides of the arachnoid, the pia mater, the lining membrane of the ventricles of the brain, and the medulla spinalis, in arachnitis, hydrocephalus, and hydro-rachitis ; the pleura in pleurisy and hydrothorax ; the pericardium in pericarditis and hydrops pericardii ; the peritoneum in ascites ; the ovaries in hydrops ovarii ; the tunica vaginalis in hydrocele ; the joints and surrounding parts in hydrops articulo-rum, and also the bursæ mucosæ of tendons ; the cellular tissue in œdema and anasarca ; the globe of the eye in hydrops oculi. The parenchyma of several organs may also be the seat of serous congestion and effusion ; the white softening of the brain seems to depend on a species of serous infiltration ; there is a serous congestion of a sub-acute character called œdema of the lungs, which is in general very obscure and intractable, and a frequent, though unheeded, cause of anasarcaous swellings in different parts of the body.

Serous congestion and effusion depend sometimes, as already stated, on debility of the vessels without previous irritation, being what is termed *passive*. In order to give a connected view of the pathology of these affections, we shall offer a few observations on this and some other causes of serous congestion, although not immediately connected with inflammation. When the powers of the constitution have been considerably reduced after protracted diseases, excessive evacuations of blood, or in old age, especially in temperaments naturally leucophlegmatic, serous effusions sometimes occur, to all appearance, from mere debility ; the lower extremities, where the blood has to overcome the greatest degree of gravitation, are most commonly first affected. Effusions from mere vascular debility are, however, by no means so frequent as was formerly imagined. It more generally happens that there is combined with debility some other cause, such as alterations in the quantity or qualities of the blood, or obstruction to its circulation.

Since the fact of absorption being actively carried on by the veins as well as the absorbents has been fully established by the experiments of Majendie, nothing can be more obvious than that the distention of the venous system by an excess of blood must have a special

influence in the production of serous congestions and effusion, by retarding the current of the blood, causing an accumulation in the minute vessels, and lessening the activity of absorption. There are cases of œdema and anasarca which can be attributed to no other cause than extreme plethora ; a remarkable one, which terminated fatally, is related by Andral. That effusion may occur from this cause is clearly proved by the fact of our being able to produce it at will by injecting into the veins a large quantity of water, so as to create a state of artificial plethora. That the absorption of the veins is greatly accelerated when in a condition opposite to that of plethora is also satisfactorily proved ; for if in the same animal we remove the plethora by abstracting blood from the veins, the serous effusions soon disappear : this explains the good effects that follow venesection in acute dropsical affections.

A diminution in the proportion of fibrine and red matter, and a corresponding increase in that of the serosity of the blood, greatly favours serous congestions and effusions : this state of the blood is induced by copious and repeated venesections, which are sometimes followed by dropsical effusions. The long-continued use of a poor and watery diet produces similar results, although the mass of the blood may be diminished in quantity. The coagulating property of the blood is destroyed also by some poisons, especially those of reptiles ; its fluidity is thus increased, and it assumes a decomposed appearance ; the unhealthy malignant inflammation excited by these poisons is accordingly combined with serous infiltrations.

Any obstruction to the venous circulation has a tendency, for the reasons already stated, to induce sanguineous congestions and serous effusions. The obliteration of the principal veins of a limb from inflammation, the pressure of a tumour, or other causes, is generally followed by œdema of the limb below the obstruction. The obliteration of the inferior vena cava causes dropsy of the lower extremities : obstacles to the circulation of the vena portæ, arising from diseases of the liver, are among the most frequent causes of ascites. Several diseases of the kidneys, which have been well described by Bright, Christison, and Gregory, produce a similar effect. When the cause of obstruction occupies the central organs of circulation, as in diseases of the heart and lungs, the dropsical effusions affect every part of the body.

Impediments to the circulation in the lymphatic vessels, which may be considered as a species of veins, are sometimes followed by serous effusions in consequence of a diminished absorption ; this is exemplified in *tabes mesenterica* and in obliterations of the thoracic duct. In some cases of chronic serous effusions Dr. Hodgkin has found the lymphatic glands enlarged and indurated without any evident change of structure, but in a state rather analogous to hypertrophy.

Besides the primary causes of serous congestion and effusion that have been enumerated, there are various secondary causes, amongst which may be noticed the suppression

of secretions, and especially that of the skin and bronchial membrane. Dropsical affections are very common in low and damp situations, which is chiefly to be attributed to the action of a moist atmosphere in lessening cutaneous and pulmonary perspiration. Copious serous effusions disappear sometimes with surprising rapidity; the fluid is in some cases transferred to another part, giving rise to a new train of symptoms; it is frequently, however, carried off by copious excretions. But there are instances of the general health being re-established without any such evacuations.

When the *mucous* and *cutaneous* surfaces are affected with congestive irritation of their serous vessels, it generally induces profuse serous excretions. These surfaces secrete two kinds of fluid, one in the form of a vapour or thin serosity exhaled by the serous vessels, such as the cutaneous and pulmonary perspiration and the watery evacuations from the bowels; the other consisting of the mucus and other secretions supplied by the mucous and sebaceous follicular glands. Very large quantities of these various secretions proceed sometimes from the skin and mucous membranes, without any morbid change in the structure of these parts, or such slight deviations only from their healthy appearance as are in no way proportionate to the severity of the symptoms. These profuse discharges can only therefore be referred to a degree of congestive irritation not amounting to inflammation. If, however, the secretions be checked, either by astringent remedies or spontaneously, the congestive irritation may be converted into active inflammation; and in this manner dysentery and enteritis have sometimes supervened on an attack of diarrhœa.* These profuse evacuations, when occurring in mucous membranes, were called by the ancients *phlegmorrhagiæ*, *phlegmatorrhagiæ*, or *fluxes*. Pyrosis, and some forms of coryza and pulmonary catarrh, have been classed by several nosologists among the *phlegmorrhagiæ*. At the invasion of coryza and pulmonary catarrh there is sometimes a very copious discharge of a watery fluid, either from the nose or by expectoration. The pituitary membrane is tumefied, but without increased redness, and the entire nose sometimes swollen. The quantity of serous fluid proceeding in some diseases from the mucous membrane of the stomach and bowels is enormous; it has amounted to several quarts thrown up from the stomach in some cases of pyrosis, and much larger quantities have been discharged by stool from the bowels in attacks of cholera and colliquative diarrhœa. These profuse excretions generally induce symptoms of as great prostration of strength as from excessive loss of blood; the skin becomes cold and clammy; all other secretions are suspended; the rapid sinking of the strength brings on paroxysms of syncope and convulsions; the blood also assumes a dark red colour, being deprived of its serum. These serous fluxes have sometimes supervened

on the sudden disappearance of dropsy either of the abdominal or thoracic cavity, and have in this way proved critical; they may occur also at the termination of febrile and inflammatory diseases, whose resolution they seem to favour.

The cutaneous perspiration is exhaled in health under the form of an imperceptible vapour. But in many diseases there is a state of congestive irritation of the skin, either primary or sympathetic, characterized by a morbid heat, and the excretion of a profuse serous fluid constituting sweat. These perspirations may likewise be critical in a variety of inflammatory and febrile diseases; in the *morbus sudatorius* they constituted the prominent symptom. They are sometimes passive, being then cold and clammy, as at the approach of death. A remarkable alternation of action is observed in some cases between the skin and mucous surface of the alimentary canal, the suppression of a profuse sweat being followed by diarrhœa, and *vice versâ*. The diarrhœa which attacks the crews of whalers on entering the regions of ice is of this nature. The skin is generally dry and rough in chronic gastritis. In pulmonary phthisis, and other organic affections of the lungs in which the pulmonary perspiration is diminished, there is generally an increase of the cutaneous perspiration, which may be considered as its substitute. The qualities of the perspiratory fluid are modified in several diseases, as is manifest by peculiarities in its odour and flavour, and by the action of chemical tests.

All *glandular* structures, such as the follicles of the skin and mucous membranes, the salivary glands, liver, kidneys, &c. may be affected with congestive irritation of their secreting vessels leading to increased excretions, without any change of structure or appearance even of vascular injection. In all catarrhal affections there is an increased secretion of mucus from the different mucous surfaces; this, no doubt, is sometimes the effect of inflammatory action; but in numerous cases there is merely a congested state of the serous vessels, and not the least appearance of increased action of the bloodvessels, as is clearly demonstrated by numerous post-mortem examinations. Nothing, therefore, can be more erroneous than the opinion of some modern pathologists, that all catarrhal affections are to be referred to inflammation. Andral very justly observes "that it would be a great error to suppose that the fever which accompanies certain acute mucous fluxes is an infallible proof of their inflammatory nature; for the simple fact of an organ being deranged in its nutrition, secretion, or innervation is sufficient to generate fever, no matter whether that derangement be attended with the augmentation, diminution, or perversion of the vital powers of the organ: the bare circumstance of a part of the living body being in a state of suffering, whatever the nature of that suffering be, is sufficient to light up the various sympathies which constitute *fever*. The existence of fever does not, therefore, necessarily imply the idea of stimulus or of excessive action; and, consequently, the object of the

* Andral, op. cit. vol. i. p. 412.

practitioner should not, in every case of fever, be to combat this stimulus; but in some cases it should be to relieve a derangement, either circumscribed and purely local, or affecting generally the blood itself, or the centres of the nervous system." This view of the subject is the most consistent, certainly, with sound reasoning and general experience. It is, moreover, now generally admitted that many of these catarrhal affections, when the period of irritation that attends their invasion has subsided, are aggravated by perseverance in an antiphlogistic plan of treatment, and are speedily relieved by tonic remedies and a nourishing diet. This is particularly evident in chronic pulmonary catarrh and in mucous diarrhoea, to which complaints persons of a relaxed phlegmatic temperament, and much exposed to wet and cold, are particularly predisposed. The secretions of the lachrymal and salivary glands, of the liver and kidneys, may likewise be considerably increased in consequence of congestive irritation of their secreting vessels.

All the affections that have been described as depending on congestive irritation of the sanguiferous or serous vessels, may assume a continued, intermittent, sporadic, or endemic form. The various secretions are in general considerably under the influence of the nervous system, and may be suddenly increased or diminished by strong mental emotions; we need only mention, in proof of this, the well-known effects of fear on the secretions of the bowels and kidneys.

It is evident, from what has been stated in this section, that the morbid condition of the vessels which we have termed *congestive irritation*, includes a great variety of diseases, some of a formidable character, and the exact nature of which has not always been clearly understood. Many of these diseases originate in a high state of congestive irritation closely allied to inflammation; the danger, however, is not always in proportion to the degree of irritation, for we have seen that some diseases characterized by only slight congestive irritation, may in certain constitutions lead to a fatal result, by inducing effusions round vital organs, or exhaustion of the nervous power from hemorrhages and excessive excretions; and that the danger in these cases is so much the greater, that their symptoms are often obscure and insidious. It has also been shewn that when, in consequence of the influence of morbid sympathies, congestive irritation has been excited in several vital organs at the same time, the simultaneous disturbance of their functions, and consequent unequal distribution of the circulating fluids, may give rise to the most formidable symptoms, and prove as certainly fatal as the destruction by inflammation of any vital organ. We have seen, also, that with regard to the treatment of congestive diseases, the practitioner must be on his guard lest the obscure and often insidious character of the symptoms should deceive him respecting the true nature of the disease; that these affections being all more or less allied to inflamma-

tion, generally require an antiphlogistic plan of treatment; that this, however, will sometimes require to be carefully modified, and is likely to prove injurious if carried beyond a certain point, as congestive diseases are often induced and aggravated by a state of general debility.

Morbid appearances of inflammation.—There are few things in the study of pathology more difficult and of greater importance than to define accurately what are the appearances in the dead body by which the different morbid affections of the vascular system, from the state of slightest injection to that of high inflammation, can be distinguished from each other. Accuracy of knowledge on this subject is evidently highly desirable, as our views of the nature of disease can be derived only from the combined evidence afforded by the symptoms observed during life, and the deviations from healthy structure found after death. Before, however, entering upon the consideration of this important part of our subject, it is necessary to premise that a variety of morbid changes of structure sometimes take place, both at the moment of death and at a certain period after, bearing a close analogy to those induced by disease: a knowledge of these changes is of the first importance to prevent their being erroneously attributed to disease.

In speaking of the functions of the minute vessels, we stated that their contractility survived for some time the action of the heart; that in consequence of this they continued to propel the blood into the capillaries and small veins in which it necessarily accumulated, while the larger arteries, not receiving any fresh supply of blood, remained empty. This sufficiently accounts for the circumstance of all delicate vascular textures, the surfaces of mucous and villous membranes; the pulp of the brain, texture of the lungs, &c. often presenting an unusually red and injected appearance in the bodies of persons who die with much blood in their system; these congestions bear a strong resemblance to the passive congestions that are formed during life. They vary according to the manner in which the circulation has been first interrupted, whether in one or both sides of the heart, or in the vessels of one particular organ. The different parts of the body may, however, assume also various degrees of redness and injection after death, which it would be a serious mistake to attribute to the effects of disease. The formation of these congestions can easily be proved by experiment; for if the colour and degree of injection of different organs be noted immediately after death, and the same organs be examined again at different successive periods, parts naturally white will be observed to become red, vessels and patches of ecchymosis become apparent where none could previously be seen. It is possible, indeed, to produce at pleasure a red congested appearance of the lung in any one of its surfaces, by letting the body lie for some time on its back, side, or face, and to bring about a similar result in any portion of the intestines by suffering it to hang in a depen-

dent position. Numerous experiments were made on this subject by Rigot and Trousseau; and the blood sometimes oozes in such quantity as to accumulate in the cavity in the form of a hemorrhage. These sanguineous congestions are formed, not only when the mass of the blood is considerable, but also after protracted diseases.*

These congestions are principally observed on the exterior of the body in the most dependent parts of the skin, such as the back and calves of the legs, which present a uniform livid red colour, disposed in stripes or patches. Red streaks, either parallel or intersecting each other, are also sometimes seen on the arms; thighs, thorax, and abdomen, and not confined to the dependent parts of the body; the vessels of all these parts, especially the veins, are found minutely injected with black blood; the streaks occur in the course of large veins, and seem to be the effect of the transudation of their blood staining the surrounding tissues. During the last moments of life, owing to the weakened action of the heart, there is less blood propelled to the surface, and it has a tendency to accumulate in the internal organs; the internal cadaveric congestions present a uniform red tint, disposed also in isolated spots, stripes, or patches; the blood escaping from its vessels forms effusions, and stains the neighbouring tissues; if there exist previously serous effusions, they become tinged with the colouring matter of the blood; there is also extravasation of the serous fluids; and effusions take place into the cavities of serous membranes or in the cellular tissue; the bile likewise transudes through the gall-bladder, and stains the surrounding parts. All these appearances are more particularly found in the membranes of the brain lining the posterior part of the skull, and in the posterior part of the spinal canal; in the lobes of the cerebellum and posterior lobes of the cerebrum; in the posterior portion of the lung; the most dependent portions of the stomach and intestines, and in the kidneys. These parts present sometimes a uniform deep red colour, resembling the most intense congestion.

At a later period, when putrefaction commences, various gases are disengaged, and particularly sulphuretted hydrogen, which penetrate the coats of the bloodvessels as well as all other tissues, change the colour of the blood, and produce the various tints of brown, livid, and green, that characterize putrefaction. These changes of colour are first noticed on the concave surface of the liver, in consequence of its vicinity to the transverse arch of the colon; they next manifest themselves in the abdominal muscles, and subsequently in the integuments.

Congestions after death are formed, therefore, in three different ways: by the gravitation of the fluids within their vessels; by transudation of the fluids through the parietes of the vessels

and imbibition of the neighbouring tissues; and by chemical affinities.

The nature of the first species of cadaveric congestion is sufficiently obvious not to require any explanation. The fact of the transudation of fluids through the membranous parietes of vessels, and of all animal tissues having in a certain degree the property of imbibition even during life, has been clearly established by the experimental researches of Majendie, Fodéré, and Dutrochet: the functions of exhalation and absorption seem to be, partly at least, carried on by transudation and imbibition. The vessels and serous membranes are, however, considerably less permeable to the fluids they contain during life than after death, which is partly attributed by Majendie to the current of circulation constantly conveying away the fluids before they can accumulate in any part; the solids are also endowed by their vital principle with a greater degree of density and power of resistance during life, whilst after death the physical laws acquire their full influence.

The patches and stripes of uniform red are the effect of this property of transudation and imbibition; the tissues appear as if soaked in blood and stained with it. This uniform red tint is frequently observed on the internal coat of the bloodvessels and of the heart; it is of a vermilion red in the arteries, and of a darker red in the veins: the redness penetrates all the coats of the smaller and thinner vessels, and extends sometimes to the adjacent tissues: the vasa vasorum of the large vessels are minutely injected. These appearances in the bloodvessels are almost constantly found at the end of twenty-four hours in the bodies of persons who have died from an obstructed state of the circulation, or from diseases in which the blood is preternaturally fluid. The small quantity of colourless or reddish serous effusion found in almost every body in the arachnoid of the brain and spinal marrow, in the pericardium, pleura, and peritoneum, thirty-six hours after death, is to be attributed also to transudation. Congestions and effusions from transudation occur most frequently in those diseases in which the blood is thin, and retains its fluidity after death, such as scorbutus, purpura hemorrhagica, and all diseases usually called putrid: they are seldom observed in the neighbourhood of large veins and arteries on account of the thickness of their coats; they are greatly facilitated by the rapidity of putrefaction, and therefore materially influenced by the heat and moisture of the atmosphere.

With regard to the effects of chemical affinities, it is important to remark that, when a portion of lung, intestine, or brain, presenting little or no vascularity, has been exposed for a short time to the atmosphere, it assumes a bright scarlet appearance, resulting from the arterialization of its blood, which, being thus more highly coloured, is apparently increased in quantity. We have already stated that the gases evolved by putrefaction give the blood a brown, livid, or green hue; the texture of the part becomes more friable and flaccid, and

* Andral, op. cit. vol. i. p. 83. This chapter contains a very full and interesting account of the occurrence of congestions and effusions after death.

these appearances have, we apprehend, been sometimes mistaken for gangrene. Further details of the cadaveric appearances will be found in Andral's *Pathological Anatomy*,* and in the works on Medical Jurisprudence by Fodéré, Paris, and Beck.

We have thought it desirable to describe at some length these cadaveric appearances, feeling the great importance of their not being mistaken for the effects of disease, especially with respect to forensic medicine. There is, perhaps, no point in pathological anatomy which has given rise to greater diversity of opinion, has proved a more fertile source of error, and remains yet more undetermined, than the exact nature of the morbid appearances which separately characterize congestions both active and passive, and inflammation. This is in fact a subject often surrounded with many difficulties, an ignorance of which has led to the erroneous practice of pronouncing hastily and indiscriminately as inflammatory, appearances of redness, injection and turgescence belonging perhaps only to either active, passive, or cadaveric congestion. We shall therefore point out, as far as we are enabled in the present state of pathological knowledge, the characteristic signs by which we can establish a line of demarcation in the dead body between these various morbid appearances.

1. The existence of various degrees of *redness* in any tissue, depending on minute vascular injection, is not alone sufficient to indicate inflammation, as redness is produced also by several forms of congestion. An increase of volume likewise is not always characteristic of inflammation; it may arise from the distended state of the vessels, or the slight serous effusions that occur in congestions both active and passive. Increase of volume may depend, moreover, on a morbid activity of the functions of nutrition and secretion, causing a diseased growth of texture without the necessity of any inflammatory action. Congested tissues become also more soft and friable in consequence of the greater quantity of fluids they contain. The redness and increased thickness of a membrane and softening of its texture cannot, therefore, be always considered unequivocal marks of inflammation.

The following are the only sure signs of genuine inflammation: considerable increase of vascularity with extravasation of blood or coagulable lymph, and the formation of pus or other morbid products, leading to a decided change in the structure of the part affected. The presence of all these signs at the same time is not, however, required: there are variations in this respect according to the texture of the part, the intensity and duration of the inflammation. A very minute injection, chiefly of the small arterial branches; a vivid red colour, disposed in dots or striæ occupying the whole thickness of the tissue, and not removable by pressure or ablation; spots of ecchymosis, occasioned by the rupture of some of the small vessels; effusion of blood on the

surface, or its infiltration within the texture of the part, are all characteristic of recent inflammation. The exudation of coagulable lymph, the secretion of pus, and the formation of ulcers, indicate a more advanced period of inflammation. This, however, is not constant, as both lymph and pus are sometimes poured out, and ulcers very rapidly formed in certain soft tissues, as, for instance, in mucous membranes. The organization of lymph and conversion into new tissues, the complete organization of abscesses, and the formation of purulent sinuses, point out inflammation of longer standing: the minute vascularity and redness have in this latter case generally disappeared.

2. Injection, redness, and patches of ecchymosis exist also in passive congestion; but the injection then is seated principally in the veins. The redness is of a dark-brown hue rather than florid; the blood extravasated is thin and fluid, and the red colour is easily removed by ablation; the texture of the solids is soft, flabby, and easily torn, and the condition of the whole body usually indicates a state of cachexia. Active congestions are distinguished from passive by the vascular injection occupying chiefly both the large and small arteries, the networks formed by their extreme ramifications being so minutely filled with blood as to impart to the tissue an intensely bright-red colour; the blood is generally very viscid, and the texture firmer than in passive congestion. This is a condition of parts bordering on active inflammation, although no distinct change of structure has yet taken place. It is often described as inflammation, and the mistake is not perhaps of much practical importance, since they both frequently give rise to the same local and constitutional symptoms, and require the same mode of treatment; the morbid appearances belonging to inflammation and active congestion are, moreover, often united in the same organ; active congestion is most frequently attended with serous effusions or hemorrhage; inflammation, more generally with the effusion of coagulable lymph and pus, or ulceration. It must, however, be acknowledged that the distinction between active and passive congestion is often extremely difficult, if not impossible; and it will be necessary in general to attend to other circumstances besides the morbid appearances; such, for instance, as the mode of death, whether it has been sudden and rapid, or lingering; attended with violent struggles, or tranquil: also the nature of the preceding disease, and the state of the other organs of the body. We may thus ascertain whether the venous system is generally congested or not; and it should be remembered that the parenchymatous and membranous organs are usually found gorged with blood after diseases of the heart and asphyxia, in consequence of the mechanical obstruction to the return of blood to the heart.

It is important, however, to remark that the morbid appearances indicating active or passive congestion, such as redness, injection, turgescence, and even slight effusions, which ex-

* Vol. i. article 4, p. 70.

isted during life, sometimes completely disappear after death. There can be no doubt that this may happen, because there are instances in which, although the skin or the eye presented some of these appearances during life, they have been found quite pale after death. When, therefore, there have been well-marked symptoms of congestive diseases during life, the absence of the usual morbid appearances after death is not always sufficient to destroy our belief in their existence. We know that nothing may be found in the brain after apoplexy from simple congestion, though such cases are not of frequent occurrence. The changes of structure induced by true inflammation, such as suppuration, ulceration, &c., are free from this source of deception.

3. A little attention will be sufficient to distinguish the cadaveric congestions arising from mere gravitation of the fluids, from those produced by disease; the vascular injection and redness is confined to the most dependent parts of organs, and is found in a number of organs at the same time, varying of course according to the position of the entire body, or of certain regions only; this should always be a subject of particular inquiry. A considerable degree of injection, therefore, confined to one organ, and especially not occupying its most dependent part, may fairly be attributed to disease. The redness, injection, and sanguineous or serous infiltrations resulting from transudation, occur at a later period after death; the tissues are of a uniform red, as if dyed with blood; the blood can sometimes be washed away by repeated ablation, or by maceration for some hours in water; but this will not be the case four or five days after death: If a considerable degree of sanguineous infiltration is observed in one organ only, some days after death, and if it be accompanied particularly with much injection of both its large and small bloodvessels, there is little doubt but that it is the effect of disease; but if similar appearances exist also in different other parts of the body, it is much more probable that they originate in the cadaveric transudation that attends putrefaction. There is frequently, however, great difficulty in forming a right judgment in such cases, and it is necessary to exercise the utmost caution and discretion on this subject when called upon to give evidence before a court of justice. The various appearances depending on the action of chemical affinities in a more advanced state of putrefaction are too well characterized to deceive any well informed observer.

In judging of the morbid appearances, it will be necessary to take into consideration:—
1. the period at which the body is examined;
2. the position of the part; 3. whether there existed any mechanical obstruction to the circulation during life; 4. the mode of death; 5. whether there were any symptoms of acute vascular disease during life.

Local symptoms of inflammation.—Inflammation has been described both by ancient and modern writers as characterized by four local

symptoms. These have been accurately noticed by Celsus: *notæ vero inflammationis sunt quatuor—rubor et tremor cum calore et dolore*.* These symptoms may not all exist in every case, but the greater number of them are usually present; they may assume also various respective degrees of intensity. In some tissues there is generally very little redness or swelling, but intense pain. The pain may be intense, although the inflammation is moderate, or the pain be slight and the swelling considerable. The heat also varies in the same manner, the inflammation being sometimes attended with little increase of heat, while the swelling is great. These four symptoms exist in a moderate degree in the first stage of the inflammatory process, sometimes described as sub-acute, and which we have distinguished from perfectly developed inflammation by the term *active congestion* or *congestive irritation*. It is only when these symptoms have acquired a certain degree of intensity, leading to morbid changes of structure, that they constitute, according to the view we have adopted, true inflammation.

Redness.—Some tissues are naturally red; their redness, therefore, must be preternaturally increased to become morbid. A quickened circulation may cause a temporary increase of redness, heat, and even swelling, which soon subsides, and is in this case only physiological; the increase of redness must therefore be permanent to be accounted morbid. The redness is manifestly owing to the increased quantity of blood in the diseased part distending the vessels, and penetrating into the minute vascular ramifications which previously conveyed only colourless blood. Mr. Hunter froze the ear of a rabbit and thawed it again; this occasioned considerable inflammation, an increased heat and thickening of the part: this rabbit was killed when the ear was in the height of inflammation, and the head being injected, the two ears were removed and dried; the uninflamed ear dried clear and transparent, the vessels were distinctly seen ramifying through its substance; but the inflamed ear dried thicker and more opaque, and its arteries were considerably larger. The redness sometimes partly depends also on the formation of new vessels, but this of course can only happen in advanced stages of inflammation. Preternatural redness alone is not sufficient to constitute inflammation; it must be accompanied with a certain degree of pain, heat, and swelling; for we have seen that it is a common attendant of congestions, active, passive, and cadaveric. Its intensity is very variable; some dense fibrous tissues, such as tendons and ligaments, exhibit very little redness when inflamed, having but few vessels; whilst in more vascular textures the redness is bright and florid, constituting one of the most prominent symptoms; as, for example, in some cases of *cynanche maligna*, in which the pharynx and tonsils are of an intense fiery red

* Lib. iii. cap. 10.

with burning heat and pain, in consequence of the extreme injection and distention of the minute vessels; when the blood, however, stagnates, the redness changes to a dark purple, indicating mortification. The same appearances are observed in gangrenous erysipelas. The redness may assume various tints, from a bright scarlet to a dark livid purple, with every intermediate shade. It may also appear in patches, stripes, streaks, or be uniformly diffused; it is generally greatest in one point, decreasing gradually as it extends, until it becomes imperceptible, or sometimes terminating abruptly. It may be made to disappear by pressure, but returns as soon as the pressure is removed.

Swelling.—The swelling is produced in the first stage of inflammation by the greater influx of blood; at a later period it is increased by the effusion of serum, the extravasation of blood, and the deposition of coagulable lymph or pus; the interruption of the absorption may also be noticed as one of its causes. The swelling often remains after the inflammation has disappeared, particularly when it has induced much change of structure. Swelling alone does not constitute inflammation; although one of its symptoms, it may be occasioned by many other causes, such as the displacement of a part, as in hernia, and the dislocation of a bone, by the effusion of blood or water, the accumulation of air, morbid growths, &c. To be inflammatory, it must be conjoined with pain or redness. The degree of swelling depends partly on the violence of the inflammation, and partly on the structure of the parts affected; there sometimes exists very little swelling, as in ophthalmia, and superficial inflammation of the mucous and serous membranes and also of the skin; the swelling is then irregularly diffused over a large surface; in other textures it may be considerable and circumscribed. Excessive swelling and redness in a part, without much heat or pain, is very likely to terminate in gangrene.

It is sometimes not easy to ascertain the existence and exact seat of swellings of the internal organs, particularly in the abdomen, and a considerable degree of habit and tact is generally required to avoid mistakes. The swelling may be fixed or moveable, pulsatile or not; it may be necessary to make the patient vary his position, or to lessen the fulness of the abdomen by emptying the bowels; the exact seat of the swelling also is to be considered, whether connected with the liver, stomach, bowels, or kidneys; situated in the mesentery, or merely in the abdominal parietes. A solid tumour sometimes pulsates in consequence of being in contact with the aorta; this must not be mistaken for aneurism. It is very important to remember accurately the natural relative position of the different organs; the same rule applies to the protrusion of tumours through the parietes of the thorax.

Whilst on the subject of swelling, we must

notice the accompanying changes in the consistence or density of the part. Some pathologists have advanced as a general proposition, that inflammation has the effect of hardening soft and softening hard textures, giving as an instance the increased firmness of hepatised lung, and the softening of inflamed bone. We conceive, however, that there is some inaccuracy in this statement, owing to the ideas attached to the terms in which it is expressed not being well defined. Almost all soft parts of the body feel harder to the touch at the commencement of inflammation, in consequence of the distention produced by a greater influx of fluids; but this increased firmness of the part is far from indicating any increase in the force of cohesion of its particles, or a real augmentation of density. A portion of hepatised is much more friable and easily broken down by pressure than sound lung, which, although more yielding to the touch, has a greater degree of elasticity and power of resistance. It is more correct, therefore, to say that recent inflammation has the effect of lessening the force of cohesion of all parts of the body both hard and soft. This remarkable property of inflammation will be fully considered in the article *SOFTENING*. When soft parts have been exposed to chronic inflammation, they often become hardened in consequence of new concrete products being deposited in their texture, or of its undergoing some change of structure by a slow and vitiated process of nutrition and secretion, as is exemplified in a variety of indurated tumours and morbid growths; in phlegmasia dolens; a peculiar form of hardening of the subcutaneous cellular tissue, and elephantiasis.

Heat.—The application of the hand to an inflamed part is sufficient to prove that its temperature is increased; the air expired, when the nostrils, throat, or bronchial membrane are inflamed, is so heated by passing over the inflamed parts as to feel burning. The sensations of the patient also indicate an increase of heat, although this is generally exaggerated in consequence of the morbidly increased state of the sensibility; in some nervous affections the patient complains of a sensation of burning heat, whilst the temperature of the part remains natural or is even diminished; there is sometimes a sensation of burning heat in gangrene, when the part is quite cold. The natural temperature of the body varies from 98° to 100° at the heart and on the trunk, but it gradually decreases as we proceed further from the heart, and as the parts become smaller and more exposed to the influence of the surrounding atmosphere; it is thus only 92° at the extremities of the body; this is a fact it will be important to remember in forming any estimate of the increase of heat in inflammation. Mr. Hunter concluded, from experiments he made, that the temperature of inflamed parts is but little augmented; he excited artificially inflammation in the chest, the abdomen, the rectum, and the vagina, without being able to discover

any great increase of temperature, the thermometer rising only to 101° ; in one case, however, it was as high as 104° in the abdomen; and in a case of hydrocele the heat of the tunica vaginalis, which was 92° at the time of performing the usual operation, rose to 98° after inflammation had come on. There must, we think, have been some source of error in these experiments, for in numerous experiments made since those of Hunter, the thermometer, when applied to inflamed parts in cases of erysipelas, phlegmonous swellings, &c. has been observed to rise as high even as 107° of Fahrenheit. It is well known also that the general temperature of the body may be very considerably increased in various states of disease, not always inflammatory. When making observations to ascertain the variations of temperature in fever, we have not unfrequently seen a thermometer placed in the axilla, or under the tongue, rise as high as from 105° to 107° : a similar elevation of temperature has been noticed in acute rheumatism, and during the convulsions of tetanus. There is generally a rise of temperature with any great local increased activity of the circulation. Sir E. Home observed the oviduct of a frog, when about to spawn, two degrees higher than the temperature of the heart. Dr. Granville states that, during parturition, he has occasionally found the temperature of the vagina rise to 120° , the elevation appearing to bear a proportion to the degree of action in the organ.* Every preternatural increase of heat is not therefore to be considered as inflammatory. In cases of fever, and especially of hectic fever, the whole body or certain regions, such as the cheeks and the extremities, may be of a burning heat for a considerable time, in consequence of a state of active vascular congestion, without any inflammation. There must be a certain degree of intensity and a certain duration of morbid heat, united with other symptoms, to constitute inflammation. Redness and swelling may also exist with very little heat or pain, and pass on to suppuration, as is the case in abscesses by congestion and other forms of chronic inflammation.

We can scarcely expect that any satisfactory explanation of the increase of heat in inflammation will be given as long as there are points in the theory of animal heat that remain involved in obscurity. As the variations of animal temperature constitute one of the most important morbid phenomena of inflammation and of many other diseases, the consideration of the various opinions that have prevailed respecting the source of animal heat, and the causes which regulate its variations in disease as well as in health, is a subject of peculiar interest to the pathologist.

The chemical theory of animal heat proposed first by Dr. Black, and greatly improved subsequently by Dr. Crawford,† was long con-

sidered to account in a perfectly satisfactory manner for all the varied phenomena of animal temperature, both in health and disease. The accuracy of this theory has, however, been called in question of late years by several able physiologists, who have drawn conclusions from their experiments tending to subvert every one of its main positions. The chemical theory assumed as fundamental facts, 1st, That the generation of heat in animals is the immediate effect of the chemical action of the air upon the blood in the lungs, leading to results strictly analogous to those of ordinary combustion; 2d, That oxygen and arterial blood have much greater capacities for caloric than carbonic acid and venous blood; 3d, That the temperature of the blood is the same on both sides of the heart, and in the large trunks of the pulmonic system; and that the evolution of heat throughout the body is the result of the capacity of the arterial blood for caloric becoming lessened when it is changed into venous, by which a portion of its latent caloric is set free.

The important fact of oxygen having a much greater capacity for caloric than carbonic acid has been denied by Delaroche and Berard; and the fact of the capacity for caloric of arterial blood being greater than that of venous has been disputed also by Dr. Davy. The experiments, however, for estimating the capacities of gases and fluids for caloric are of so delicate a nature, and liable to so many sources of error, that the conclusions of these two gentlemen are by no means considered as fully proved. It has been asserted also, as the result of numerous experiments, that the heat of the blood on both sides of the heart is not uniform, but that the arterial blood is warmer than the venous by one or two degrees: it must be acknowledged that this opinion seems to have a great weight of evidence in its favour.

The experiments, however, which would have most completely overthrown the chemical theory if their conclusions had been confirmed, were those of Mr. Brodie; they led to the conclusion, by maintaining artificial respiration in decapitated animals, that the generation of heat has no connexion whatever with the changes the air and blood undergo in the lungs, but is entirely dependent on the influence of the brain and nervous system.* Legallois having, however, performed experiments of a similar description, arrived at conclusions directly opposed to those of Mr. Brodie, and tending strongly to confirm the opinion of the evolution of heat always bearing a relation to the consumption of oxygen.† The inaccuracy of Mr. Brodie's conclusions was further clearly established by the investigations of Dr. W. Philip, who pointed out several important sources of error in his experiments. While, however, it is admitted by Dr. W. Philip that the action of the

* Phil. Trans. for 1825, p. 262.

† Experiments and Observations on animal heat, &c. by Adair Crawford, M.D., F.R.S., L. & E., &c.

* Phil. Trans. for 1811, p. 37; also Phil. Trans. for 1812.

† Ann. de Chim. et Phys. tom. iv. p. 5-113.

air upon the blood in the lungs is the great source of animal heat, he has been led to conclude by some ingenious experiments, that its extrication from the blood throughout the system depends on the direct action of the nervous influence on the blood, and that the generation of heat may therefore be regarded as a kind of secretion.*

The advocates of the chemical theory have differed with respect to the part of the animal economy in which the combination of the oxygen of the air with the carbon of the blood takes place. Dr. Crawford maintained that the carbonic acid is formed in the lungs; that the heat evolved by its production is absorbed and becomes latent in consequence, as before mentioned, of the great capacity for caloric of arterial blood; and that it is again set free on the blood being changed into venous. Lagrange and Hassenfratz conceived that the air is absorbed by the blood in the lungs, and that the combination of its oxygen with the carbon of the blood takes place in the course of circulation, leading in this way to a gradual evolution of heat. Dr. Edwards has adopted this opinion, and supported it by experiments which appear extremely conclusive. Mitchel and Faust, however, having lately made in America some highly interesting experiments on the *endosmosis* of gases, consider that they have ascertained, beyond all doubt, that the carbonic acid is generated in the lungs.† If it be true, as stated by some able chemists, that the most delicate analysis can detect no carbonic acid in venous blood, this would at once prove fatal to the opinion of Lagrange.‡

On the whole the weight of evidence seems to be still greatly in favour of Dr. Crawford's theory; and although doubts may have been thrown out on the accuracy of some of his fundamental conclusions, none of them have yet been successfully controverted. It appears highly probable that no theory can ever be established without a due reference to the connexion which respiration has with the production of animal heat. It must, in the meantime, be admitted that the temperature of a part is not always in proportion to the strength and rapidity of its circulation, and that there are other circumstances, not hitherto well understood, by which the phenomena must to a certain extent be influenced: this is particularly the case with respect to the circumstances that influence the extrica-

tion of heat, and regulate the ever varying changes of temperature in different parts of the body. In some cases, for instance, of gouty inflammation, the heat of the part feels extremely pungent to another person, although there is not the least symptom of any increased influx of blood; the heat of the surface of the body is very high in some nervous fevers in which the vascular action is only moderately increased. Dr. Hastings states that he has seen several cases of fever in which the circulation was even remarkably slow, the pulse being only 45 when the temperature of the body was 105°; and that the heat has also been 100° in cases of hydrocephalus with a pulse at 60 or 70.* There is great reason to believe that the influence of the nervous system over the evolution of heat throughout the body is very considerable, especially in some states of disease; and if this be a well-founded conjecture, it would enable us to explain in a perfectly satisfactory manner several of the phenomena of this interesting process, which cannot so well be accounted for on chemical principles.

There is one circumstance, besides chemical action, which must, we conceive, have a considerable degree of influence in modifying the animal temperature, and which appears to us to have been hitherto too much overlooked. The various materials of which the body is composed are undergoing, during the process of assimilation, disassimilation, and secretion, an incessant change of state; some passing from the gaseous to the fluid, and from the fluid to the solid state, whilst others experience similar changes in an inverse order. These variations of density must necessarily be attended with both a considerable extrication and absorption of caloric, partly, no doubt, under the influence of chemical and electro-galvanic agency. It is, therefore, reasonable to suppose that the diffusion of animal heat throughout the body is in some measure connected with the operations, physical, vital, and chemical, constantly going on in the extreme vessels; and we shall probably never be able to construct any perfect theory of animal heat until we are better acquainted with the functions of these vessels. It is well known that every material disorder of the functions of nutrition and secretion modifies the temperature of the body: when the powers of assimilation exceed those of disassimilation, and the function of nutrition is in great activity, the faculty of producing heat is considerably increased; while, when the waste of the body surpasses its nutrition, the faculty of producing heat is weaker. Thus, in healthy individuals in the prime of life this faculty is greater than in old and sickly people: this is likewise exemplified by the cooling effects of the evaporation of the cutaneous perspiration, and, in dogs, of the pulmonary exhalation. In inflammation there is a great accession of nutritive fluids, which, becoming condensed, necessarily give out heat, whilst absorption and disassimilation are completely suspended; this

* It has been ascertained by Prevost and Dumas, from some very valuable experiments upon the proportional quantity of globules contained in the blood of different kinds of animals, and of different parts of the sanguiferous system in the same animals, that there exists an exact ratio between these globules and the temperature of the animal, which is highest in those whose blood contains the largest proportion of globules.

† American Journal of Med. Sciences, vol. vii. Philad., Nov. 1830.

‡ A good account of the various opinions brought forward on the subject of animal heat, and of their respective merits, will be found in Dr. Bostock's valuable Elementary System of Physiology, vol. ii. p. 243.

* Hastings on Inflammation, p. 110.

must inevitably create a considerable preponderance in the extrication of heat over its absorption, and contribute to raise the temperature of the part.

Dr. Edwards has adopted the conclusion, from his beautiful experiments *On the Influence of Physical Agents*, that the production of animal heat is to be referred to a special power possessed by the living body, a kind of calorific function, which varies according to age, states of health or disease, and climate; that this power of generating heat is intimately connected with the respiratory, circulating, and secreting functions, and that it cannot suddenly undergo any permanent alteration during health. Dr. Edwards's interesting experiments admit of some important applications in pathology. The power of generating heat is distinctly proved to be less in children than in adults by nearly five degrees of Fahrenheit, and their temperature can, therefore, only be maintained at the standard of health by artificial heat, contrary to the commonly received pernicious opinion that children resist cold better than adults: this is fully confirmed by the great tendency observed in children to become cold and pallid, and to be affected with other symptoms of exhaustion, from the incautious use of bleeding and purging. The faculty of producing heat diminishes as the heat from external agents increases, and *vice versa*; so that this faculty is greater in the inhabitants of cold than in those of hot climates. But the power of generating heat is not capable of being either increased or diminished *suddenly* during health; hence the injury sustained by all sudden changes of the atmospheric temperature. When an inhabitant of the north removes to the south, his faculty of producing heat being too great in relation to the climate, there is an excess of heat in his system, by which he is greatly predisposed to inflammatory affections; and this will continue to be the case until his power of generating heat has been gradually lowered, so as to become adjusted to the climate: a change of this description is found to require in general about two years. Recent experiments, made with great accuracy, prove that animal temperature is not, as was supposed, equalized all over the globe. Dr. John Davy ascertained that the inhabitants of Ceylon have a higher temperature than Europeans by nearly two degrees; this is the effect of the heated atmosphere in which they live, and would be still greater were it not counterbalanced by the circumstance of their generating much less heat than Europeans.*

Dr. Edwards observes, also, that the faculty of producing heat is considerably modified by disease. In all inflammatory diseases it is greatly increased; in chronic and organic diseases, especially of the organs of respiration and circulation, it is often much lowered. In-

dividuals labouring under such diseases are consequently observed to suffer severely from cold, and to be in general benefited by emigration to a warmer climate, where a diminished power of generating heat is more compatible with the enjoyment of good health.

Pain.—Pain has a highly important influence in inflammation; it varies from the slightest increase of sensibility to the most violent suffering. It may be induced by an irritation of the nervous system without any corresponding increased action in the vascular system; severe spasm causes intense pain, as is seen in cramps. There are excruciating neuralgic pains of long continuance, as in tic douloureux, without any accompanying inflammation. In consequence, however, of the intimate connexion between the functions of the nervous and vascular systems, and especially those of the minute vessels, nervous irritation is generally attended with increased vascular action. We have already seen that the first effect of the application of irritants to the living body is the excitement of pain, and that this is soon followed by an accelerated circulation and increased flow of blood to the part. It is not easy to explain why the action of irritants is sometimes confined to the nervous system, unless we can suppose that there is some state of disease affecting exclusively the structure or function of the nerves.

The pain in inflammation is either to be attributed to the direct irritation of the nerves by the exciting cause, or to their compression in consequence of the over-distention of the vessels, or the stretching of the fibres of the part: the pain is often increased with each dilatation of the arteries, constituting what is called pulsatile pain. There are great variations in the degree and nature of the pain, depending on the texture of the part, the number of its nerves, the violence of the inflammation, nature of the irritating cause, &c.: it must be acknowledged, however, that until we are better acquainted with the structure of the nerves and nature of the nervous principle, we can scarcely hope to account for all the varieties of their morbid excitement.

It is generally very acute in parts largely provided with nerves, and especially when they are delicate and pulpy; for the degree of pain is rather in proportion to the number of nerves terminating in a part, than to the size of the nerves passing through it. In parts of a dense and unyielding texture the pain is also generally very severe, although they have but few nerves, and are not naturally endowed with much sensibility: this is owing to the great compression of the nerves by the distended vessels. We see this exemplified in bone, tendon, ligament, all fibrous textures, and even the hard cartilaginous surfaces of joints, which become red and extremely painful under inflammation: the same takes place in soft parts whenever surrounded by fibrous bindings. When there is great tension, the pain is often so excruciating as to disturb the whole nervous system and bring on delirium; hence the good effects of relieving the

* Some observations having been made recently by one of our medical officers on the coast of Africa on the comparative heat of Negroes and Europeans, it was found that the temperature of the former was several degrees higher than that of the latter.

tension by practising incisions even in the early stages of inflammation before the formation of matter: they are often followed by the instantaneous remission of fever and delirium. This is probably the reason of the inflammation of serous membranes, which are generally spread out tightly, being attended with much more violent pain than that of mucous membranes. Mucous membranes are also much less sensitive than the skin, and their inflammation is often not attended with much pain: this is one reason for the inflammatory affections of the mucous membrane of the alimentary canal having been so often overlooked. The degree of pain is not always therefore in proportion to the original sensibility of the part, but depends also on its tense and unyielding character.

The pain is usually pruriginous, pricking, and burning in the skin; acute and shooting in serous membranes; dull and throbbing in cellular and parenchymatous organs; lancinating in cancer and malignant tumours; obtuse and heavy in glands and bones. A sense of weight and throbbing generally indicate a tendency to suppuration, and the pain usually subsides on the formation of matter, particularly if it has a free issue. The pain is in some instances continued, in others periodical: the sensibility of some of the organs of sense, such as the nose and mouth, is diminished during inflammation, whilst the eye and the ear, when inflamed, become exquisitely sensible. The pain is sometimes so slight, that it amounts only to a morbid soreness or tenderness on pressure. Besides pain, the sensibility of the part is morbidly increased to all external impressions, so that those which before gave pleasure become painfully exciting. Most of the internal organs perform their functions during health without transmitting any perceptible impression to the sensorium; but when inflamed, we become immediately conscious of their various actions, in consequence of these being attended with uneasiness and pain: we can then distinctly *feel* that we have a stomach, heart, lungs, &c.: these sensations are always sure signs of a state of disease, and intended no doubt as warnings that we may avoid persisting in the use of what might prove injurious.

The pain arising from mere spasm is generally lessened by pressure, as is observed in colic; and this forms a good distinction from inflammatory pain, which pressure aggravates. The pain of inflammation is, however, chiefly increased by sudden and partial pressure; for frequently a gentle pressure of the whole of the inflamed part gradually increased, can be endured without pain, and even mitigates it.* One of the effects of general pressure is to diminish the influx of blood, and lessen in this way the swelling, the heat, and all the other symptoms of inflammation. General and graduated pressure has on this account

been recommended, and sometimes successfully applied as a remedy: it has been used to this effect by Dr. Balfour in rheumatism, by Mr. Carmichael in cancer, and Mr. Velpeau in erysipelas. We have witnessed good effects from it in some cases, but have seen it aggravate the symptoms in others.

The sudden disappearance of intense pain in a highly inflamed part often indicates the approach of gangrene. Very severe pain has a great influence in inflammation by the morbid sympathies and constitutional disturbance it excites.

Some caution is frequently required in ascertaining the existence of pain. Under certain states of general nervous irritability, the patient complains of tenderness in whatever part of the body pressure is applied; this tenderness is sometimes greater, or perhaps entirely confined to certain regions, and more particularly to the epigastrium and the hypochondria. There is in some nervous persons at all times a great intolerance of pressure in the epigastrium. We have known a hasty and superficial examination in such cases lead most erroneously to the conclusion of inflammation being present, and to the consequent adoption of active remedies, where there was no actual disease. Mistakes of this kind are by no means of rare occurrence in the present times, since the minds of practitioners have been so exclusively occupied with the idea of the great prevalence of inflammatory diseases over all others, and especially of gastro-enteritis; and persons have in this manner not unfrequently been subjected, without the least occasion, to long courses of bleeding, purging, and mercurial treatment.

The presence of pain or tenderness alone without any of the concomitant symptoms, is never sufficient to constitute inflammation; by diverting a little the patient's attention, and then gradually repeating the pressure, it will often be found that his first complaints were greatly exaggerated. There is in general much difficulty in ascertaining the seat of pain in infants, as they merely exhibit general signs of suffering, without being able to describe their sensations. It will be necessary in such cases to watch carefully the expression of the countenance for the ordinary indications of pain, when pressing the different parts of the body: infants are sometimes observed to carry frequently their hands to the part of the body that is affected.

Pain, even of the most intense description, may also become latent, in consequence of the sensibility of the sensorium being impaired by disease. This not unfrequently happens in febrile affections when the head is much affected; local inflammations, which at first complicated the fever, may thus be supposed to have subsided, while in reality they are only masked, and are proceeding in their destructive course: it is necessary, in order to guard against this deception, to make daily, in such cases, a minute and careful examination of the condition of the principal viscera.

* Dr. Elliotson's Lectures on Inflammation, Med. Gaz. Nov. 26, 1831, in which a clear and comprehensive description is given of the local symptoms.

There is another source of delusion with respect to pain: it is sometimes felt at a distance from the seat of the inflammation in a greater degree than in the diseased part. In such cases the pain is generally conveyed by nerves passing through the inflamed part to other remote parts, in which they terminate. We have familiar instances of this peculiarity in the morbus coxarius, in which the only pain complained of is frequently in the knee, and sometimes likewise in sciatica.

There is a particular expression of countenance characteristic of the existence of pain in each of the different viscera; the contraction of the forehead and eye-brows, combined with a wild, staring, or heavy expression of the eyes, are the usual indications of pain in the head. The distention of the *alæ nasi*, contraction upwards of the commissures of the lips, and of the cheeks, and protrusion of the eyes united to heaving of the shoulders, point out pain in the thoracic viscera. A falling in of the cheeks, contraction downwards of the angles of the mouth, an elongation and pinched appearance of the features, with sunk eyes and pallidness, indicate abdominal disease. There is an expression of great dejection in all chronic diseases of the urinary organs.

Besides the local symptoms just described, there are others which have reference to the disturbance of the functions of the organs affected. Thus, inflammation of the brain is attended with delirium, vertigo, coma, convulsions, and paralysis; inflammation of the larynx with a shrill, crowing, hoarse, or feeble voice, and difficulty of breathing; that of the pharynx with difficult deglutition; that of the lungs with dyspnœa, cough, and various kinds of expectoration; hepatitis with pain in the shoulder and larynx, besides pain, heat, and fulness in the right hypochondrium; gastritis with nausea and vomiting, besides fulness, heat, pain, and great tenderness in the epigastric region; nephritis with retraction of the testicle and vomiting; panaris with swelling of the glands of the axilla, &c. When the inflammation affects exhaling and secreting organs, there is a change in the quantity and quality of the secretions; they are at first diminished, or even suspended; they then return altered perhaps in colour, thickness, or smell.

In the inflammation of internal organs these functional and sympathetic symptoms are often of the greatest value, as the more ordinary local symptoms are mostly beyond the reach of our observation. When the inflammation is extensive and severe, the functions of other organs are also disturbed; the whole constitution may become more or less affected; and this affords another class of symptoms called *constitutional*, from which we often derive considerable assistance in our diagnosis. These form the next subject of consideration.

Constitutional symptoms of inflammation.—It has already been stated in the experimental inquiry into the nature of inflammation, that the action of stimuli on the living body was not

always limited to the part to which they were applied, but extended frequently to the whole animal economy, exciting various degrees of disturbance in its several functions. The existence and nature of this constitutional derangement was demonstrated by several experiments.

Inflammation may extend in several ways beyond its original seat. By continuity:—when it extends along the surface or throughout the substance of the same tissue: thus there is a great tendency to the rapid diffusion of inflammation along the surface of the skin in erysipelas; and the same is observed in the inflammation of mucous, serous, and fibrous membranes. By contiguity:—when it is communicated to adjacent tissues of a different nature: the inflammation often extends in this manner from serous membranes to the organs they invest. The facility with which inflammation spreads by contiguity depends, in a great measure, on the disposition of the connecting cellular membrane: when loose, it transmits the inflammation rapidly from one part to the other; but when dense, it appears to oppose strongly the propagation of the disease. It was a remark of Laennec, that congestions and gangrene had a greater disposition to spread by contiguity, and acute inflammation by continuity.

The local extension of inflammation is, on the other hand, checked by differences in the texture, the vital properties, and in the functions of the various organs and tissues of the body; and we may add, that general tendency in all living matter to resist the destructive effects of disease. One of the means by which this is effected is the effusion of coagulable lymph, and contraction of adhesions around the seat of the inflammation; so that the continuity of the parts is interrupted, and the disease circumscribed.

The communication of inflammation to parts of the body *remote* from its original seat takes place in two different ways, either through the medium of the circulation, or that of the nervous system. It has been satisfactorily proved, by direct experiment, that when deleterious substances are inserted into any part of the body, they are sometimes absorbed into the bloodvessels, and conveyed by the blood to remote parts, where they excite various diseased actions.* We have further demonstration of this being the case from numerous pathological facts, as in the morbid effects of various animal and other poisons, which it would be difficult to explain in any other manner than by the absorption of the morbid matter. It is, therefore, very generally admitted that the blood is the vehicle of a great many morbid principles; and that the deterioration of its qualities is to be placed among the most frequent causes of disease. In inflammation it is easy to conceive, when it is either of an unhealthy character or the result of a specific cause, how the morbid

* Majendie's Physiology, p. 347, Milligan's translation.

products of the local affection, being absorbed into the blood and circulated with it throughout the body, should sometimes excite inflammation in distant organs, and disturb the general health. Morbid impressions are, however, transmitted also from one part to another by the nervous system; and nervous sympathy is therefore another great cause of the constitution being so frequently and variously affected by local inflammation. We think it, therefore, desirable to offer here a few observations on the influence of sympathy.

The structure of the human body is very complicated, its elementary materials being so arranged as to constitute an assemblage of tissues and organs having distinct physical and vital properties; these tissues and organs act reciprocally on each other, producing by their combined operations the complex phenomena of life. Every living part of the body has a general sympathy with the whole system, or a particular sympathy with certain parts of it; and the functions of each part are more or less essential to the healthy action of the whole. The influence of these reciprocal sympathies is, therefore, very considerable, especially in disease. It is through the medium of the brain and nerves that sympathies are established between all parts of the system: receiving morbid impressions from diseased parts, the nerves transmit them to the other organs of the body, and in this manner become the source of an infinite variety of both local and constitutional morbid phenomena.*

Inflammation in one part of the body may also disturb the functions of the others by its direct influence on their circulation, independently of any nervous sympathy. The great accumulation of blood in an inflamed part may be the means of depriving another of its usual supply of blood; thus the inflammation of internal organs attracts sometimes the blood from the surface towards the centre of the body, creating coldness and pallidness of the skin; the lower extremities are likewise cold in cases of determination of blood to the head; on the other hand, if the regular return of the blood to the heart be prevented by the inflammation of any of the central organs, such as the lungs, heart, large vessels, &c. this will cause it to accumulate in remote organs, and impede their functions. These unequal distributions of blood from the mere mechanical derangement of the balance of the circulation are of frequent occurrence, and a much greater source of constitutional derangement than has generally been supposed: they may be looked upon as a species of *sanguineous* sympathy.

There exists a strong sympathy also between the different organs engaged in the same func-

tion: when the stomach, for instance, is in a state of disease, all the other organs belonging to the digestive function are more particularly predisposed to sympathise with it. One eye has also been known to become inflamed through mere sympathy with inflammation that existed previously in the other. This kind of sympathetic influence has been called *sympathy of function*. It has been advanced by Bichat that similarity of structure chiefly is a great source of sympathy, and that, for example, when a serous or fibrous membrane or a muscular organ was inflamed in one part of the body, there was a strong tendency to inflammation of the same textures in every other part of the body.

The various morbid sympathies and constitutional symptoms to which they give rise, are considerably modified by those peculiarities of constitution which have been termed temperaments and idiosyncrasies. The temperaments are formed by a preponderance in the development and activity of certain tissues over others in the same body; they may be divided, to suit practical purposes, chiefly into four—the sanguineous, bilious, phlegmatic, and nervous; there are, however, various combinations of these, forming a number of subdivisions. By idiosyncrasies are meant peculiarities of constitution belonging only to one or a few individuals; these are innumerable, often discovered only by accident, and in general difficult to explain. Thus certain alimentary and medicinal substances affect some individuals in a manner totally opposite to their general mode of action. There are also predispositions of the constitution to certain forms of disease, which are called *diatheses*. Having premised these general observations on the different modes of extension of inflammation on sympathetics and temperaments, we shall proceed to the important consideration of, 1st, the influence of the constitution on local inflammation; and, 2dly, of the various forms of constitutional derangement induced by inflammation.

Influence of different states of the constitution on local inflammation.—We have already had occasion to remark that every living part seems to be endowed with an inherent faculty of resisting, to a certain extent, the effects of disease. We are unacquainted with the nature of this faculty: it cannot be satisfactorily accounted for by structure, and is to be referred most probably to the immediate influence of the vital principle; it has been designated accordingly by the ancients *vis medicatrix nature*. It is in consequence of this faculty of resistance, that whenever a living part has sustained any injury, either from external or internal causes, an increased activity is soon observed to take place in most of its vital actions, and a process *essentially vital* is set up, by which the effects of the injury are often prevented, removed, or repaired.

The faculty of resisting disease is observed to exist in different degrees in different individuals, and in the various parts of the same body. It is generally greater or less in proportion to

* See Dr. Thomson's account of particular sympathies in his Lectures on Inflammation, and also some excellent remarks on the influence of local and general sympathies in the work on inflammation by Mr. James, Second edition.

the strength and soundness, or weakness and unsoundness, of the constitution. In strong and healthy constitutions, there is in general only moderate predisposition to inflammation, even after the severest injuries, which are repaired by a mild though efficient degree of inflammatory action. But in individuals whose constitutions are either originally weak, irritable, or unsound, or have been rendered so by long-continued disease, the tendency to resist inflammation is much weaker, and when excited, it is generally more violent, spreads more rapidly, and is less easily removed. It is also well known that parts of the body having a low vitality, such as tendons, ligaments, bones, &c. resist inflammation much less effectually than those more highly organized. It is highly important, therefore, in a practical point of view, to remember that there are circumstances in which the violence and spreading of inflammation may be greatly increased by a state of general debility.

A disordered state of the constitution operates not only in favouring the increase of inflammation, but opposes also a formidable obstacle to the establishment of those restorative processes by which it is brought to a favourable termination. The principal sources of disorder in the constitution by which local inflammation is liable to be affected, may be referred to the following: a state of general plethora combined with an over-degree of activity in all the functions of life—an opposite condition of the system arising from deficient nourishment, and attended with general languor and debility—the vitiation of the qualities of the blood and other animal fluids, the effect either of bad food and air, or of the introduction into the animal economy of morbid and other deleterious substances—a disturbed and irritable condition of the nervous system—a disordered state of the digestive function, and that in general of any of the vital functions—organic disease of an important organ—and, lastly, a predisposition to some form of specific disease, such as scrofula, gout, cancer, &c. Innumerable examples of the influence of all these morbid conditions of the constitution upon local inflammation might easily be adduced, were it not incompatible with the limits of this article; but we shall have occasion to enlarge upon this view of our subject when treating of the constitutional effects of inflammation.

There is one highly important practical rule to be deduced from the preceding considerations, namely, that from whatever cause the disorder of the constitution may proceed, the attention of the practitioner must be first directed to the amendment of the general health before he can hope to succeed in removing the local disease; this latter must in fact be treated by constitutional remedies; for if local applications only be relied upon, they will seldom be found of much avail. The merit of having called the attention of the profession to this important principle in pathology, is due, as already observed, to the late Mr. Abernethy, who directed more especially his inquiries to

the influence of the state of the digestive organs over local diseases: we must refer the reader for fuller details on this important subject to Mr. Abernethy's valuable writings.*

Various forms of constitutional disturbance induced by inflammation.—Inflammation of any parts of the body, whenever it is very intense, excites a disturbance in the functions of the heart, brain, and stomach, characterised by a series of morbid phenomena which have received the name of *symptomatic* or *sympathetic fever*. This morbid state of the constitution reacts, however, powerfully in its turn on the local inflammation by which it has been excited, so that there exists the most intimate connexion between the local affection and constitutional reaction. This is a circumstance leading to highly important consequences, for the sympathy of the constitution is generally the result of a salutary effort of the powers of life to assist in arresting the progress or removing the effects of the local disease, and the accomplishment of this desirable end depends in great measure on the local and constitutional morbid actions being duly balanced.

Many proofs can be adduced in support of this mutual dependence of the local and constitutional affection upon each other. The reaction of the constitution corresponds generally in degree with the strength of the local inflammation, the former being aggravated or diminished in the same proportion as the latter increases or lessens. When the reaction is excessive, it tends to aggravate the local disease: when, on the contrary, the reaction is deficient, the local affection may either remain stationary and assume a chronic character, or it may increase rapidly, and affect by sympathy remote parts of the body, as sometimes happens in the unhealthy inflammation excited by morbid effluvia or animal poisons. It is well known that if the constitution becomes much disordered, or if its powers happen to fail during the progress towards restoration of any wound, the inflammation of the wound, which was before perfectly healthy, either assumes immediately an unhealthy character, or entirely disappears, leaving the part even sometimes in a state of mortification. The discharge from a wound, moreover, is generally scanty, and never of a healthy character as long as the symptomatic fever continues high; but as soon as the fever abates and the general secretions are restored, the discharge becomes more copious and healthy. If, on the other hand, an individual reduced to a state of extreme debility from severe local disease, be seized with inflammation of a vital organ, he will sometimes bear with impunity a degree of general depletion which would have been previously sufficient to destroy him.† The preceding instances, to which many others could easily be added, will be sufficient to establish the fact of the existence of the closest sym-
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* On the Constitutional Origin of Local Disease.

† James on Inflammation, p. 46.

thy between the local and constitutional morbid actions.

The constitutional reaction not only varies, as already stated, in degree, but also in its nature; and the correspondence is likewise maintained in this respect between the local and constitutional affection. The character or type of the symptomatic fever is influenced chiefly by the following circumstances in the temperament and previous state of health of the individual,—the seat and extent of the local affection, and the nature of the exciting cause. In individuals of a sanguineous temperament there is generally a strong reaction of the vascular system, and the type of the fever is essentially *inflammatory*, and seldom attended with much danger. In those of a nervous and irritable temperament, or whose constitutions have been weakened by disease, the fever is chiefly characterized by considerable disturbance of the *nervous system*, and by a variety of anomalous and untoward symptoms; there is frequently in this form of fever a degree of over-excitement followed by rapid collapse. The character of the reaction, however, may be entirely derived from the seat and extent of the inflammation, or the nature of the exciting cause: thus the inflammation of fibrous tissues, that consequent upon extensive injuries, or poisoned wounds, &c., generally induces very great disturbance of the nervous system, and the most dangerous forms of sympathetic fever, even in robust and healthy subjects. It is worthy of remark in these cases, that whenever we can change the character of the local disease by substituting healthy for unhealthy inflammation, the character of the constitutional affection becomes also immediately impaired.

There is another important form of constitutional affection that differs widely from the preceding; it is characterized by the total absence of all reaction, and by a state of direct prostration and rapid sinking of the powers of life; this dangerous affection may also depend either on the temperament and previous state of health, the seat and extent of the local affection, or nature of the exciting cause.

The constitutional symptoms present other variations with respect to their character or the order of their appearance; they may be remittent or intermittent; precede the appearance of the local symptoms, occur simultaneously, and sometimes only after them. The character of the fever may be modified by the inflammatory and nervous types being combined in an almost infinite variety of degrees. It would be impossible, however, to describe every shade of difference; and we think it sufficient therefore for practical purposes, to adopt the division of the constitutional affections into, 1st, *inflammatory reaction*; 2d, *nervous reaction*; and 3d, *the state of direct prostration and rapid sinking without reaction*. We must be understood not to use the terms inflammatory and nervous in an exclusive sense, but as only implying that such is in each case the predominant nature of the reaction.

1. The appearance of the constitutional as well as of the local symptoms does not always immediately follow the introduction of a morbid agent into the system; a period of variable duration often intervenes, which may be considered as one of *incubation*. This important period is sometimes characterized by a certain degree of constitutional derangement; the symptoms of this derangement being, however, obscure, have not hitherto obtained the attention they perhaps deserve, and are often unnoticed both by the patient and the practitioner. There may be a feeling of general uneasiness and lassitude; pains in the limbs, disturbed sleep, sometimes headach, depression of spirits, slight alternations of chill and heat, a decrease of appetite, a bitter taste, clammy and furred tongue, a tendency to constipation, and turbid urine: other symptoms, besides the preceding, might no doubt be sometimes detected by close observation; they all indicate the latent influence of some morbid cause, acting on the entire system, and depressing more especially the functions of the circulation and innervation.

After the period of incubation has lasted a variable interval of time, the local symptoms of inflammation generally make their appearance; and these are followed sooner or later by a more marked degree of constitutional disturbance. The patient is seized with rigor, nausea, or vomiting; the face is pale, the skin cold and rough, the pulse small and frequent: to this depression succeeds a general reaction, characterized by a dry burning heat of the skin, headach, flushing of the face, pain in the loins, restlessness, great general anxiety, soreness of the whole body, and sometimes delirium. The pulse is full, hard, and frequent; the breathing hurried; the secretions become diminished and altered; the tongue is furred, dry, and red, especially at the edges and point; there is loss of appetite and great thirst; the bowels are confined; the urine is scanty and high-coloured, but it remains clear and emits a strong animal smell. The blood drawn from the veins is buffed and cupped, a state of the blood which has already been fully described. These symptoms vary in severity and duration according to the seat and intensity of the inflammation.

In all inflammatory affections there are also daily variations in the acuteness of the symptoms, constituting paroxysms of exacerbation and remission. The exacerbations generally occur towards night, when there is an increase of the pain, heat, and swelling, and an exacerbation of all the febrile symptoms. As the morning approaches, the symptoms lessen in severity, and there is either a partial or complete remission of fever, characterized by an abatement of the pain, and frequency of the pulse, and by the breaking out of moisture on the skin.

Besides these daily variations, the course of inflammatory affections may be divided into three periods—one of invasion, one of increase, and one of decline. The febrile symptoms already described persist, varying only

in intensity, until the inflammation has reached its height. During the period of decline they are variously modified according to the mode of termination of the local disease: if by resolution, there is a gradual abatement of the fever, attended usually with a restoration of the diminished secretions and critical evacuations from some of the excretory organs. Thus, as the local symptoms decrease, the frequency of pulse and heat of the skin gradually subside; the tongue becomes moist and clean; the thirst, restlessness, general pains, and delirium disappear; there is a variety of critical evacuations by profuse sweat or a copious flow of urine; by diarrhœa, expectoration, ptialism; or by spontaneous hemorrhage from the nose, stomach, bowels, kidneys, or uterus. These critical discharges occur either singly or are variously combined; they are frequently preceded by a severe general rigor and exacerbation of all the constitutional symptoms, *exacerbatio critica*, which is sometimes mistaken for an aggravation of disease, but is soon followed by profuse sweat and other evacuations, which lead to a complete remission of the fever. The variations in the state of the urine deserve particular attention; a full account of them will be found under the section *Resolution*. The ancients attributed these critical evacuations to the expulsion of the morbid matter, by which blood and humours were deprived of their inflammatory and other deleterious properties; and they considered them as being strictly analogous to the suppuration of phlegmon.

When, however, the inflammation terminates in suppuration, there is during the period of decline an imperfect remission only of the constitutional symptoms; the fever returns after a deceitful suspension or partial abatement of its symptoms for a few days. It assumes a more decidedly remittent character; slight paroxysms of rigor are experienced towards evening or after the meals, followed by flushes of heat, particularly in the cheeks, hands, and feet; also thirst, restlessness, and frequency of pulse; the exacerbation increases until towards morning, when it is relieved by profuse perspiration, and there is a well-marked remission of fever during the forenoon; this constitutes *hectic fever*, which has been fully described in the article *FEVER*.

The sudden cessation of violent pain attended with prostration of strength, increased rapidity, weakness and irregularity of the pulse, cold clammy sweat, and delirium, denote the fatal termination by gangrene.

It is important to observe, that when the period of increase of the inflammation has been attended with high general excitement, that of decline is sometimes marked by a great and dangerous collapse of the powers of life, particularly in old people and young children. The probability of such an occurrence should be carefully kept in view, in prescribing active remedies during the violence of the disease in such subjects; for otherwise a state of fatal sinking or dropsical effusion may be brought on by too active a treatment, although

it may perhaps have appeared justified at the time by the immediate relief it afforded. If old people were formerly stimulated to death under the mistaken notion that they are not subject to inflammation, we suspect that some in the present day may have sunk under the indirect effects of excessive bleeding, owing to a disregard of the practical precept just alluded to.

The series of constitutional symptoms we have just described are those of the simplest form of inflammatory fever. This fever is generally induced by the development of common acute inflammation from either accidental or constitutional causes; it affects most commonly robust healthy individuals, of a sanguine temperament, in whom there is a redundancy of rich blood—a condition of the system which has received the name of inflammatory diathesis. The simple inflammatory fever may be considered as a salutary effort, by which the general powers of the constitution are brought into action, in order to assist in relieving some part of the body from a state of disease, by which the harmony of the functions, essential to health, is more or less disturbed. The fever may itself become a source of danger, when too violent, by aggravating the primary disease, or by exciting inflammation in other parts of the body; or when, from deficiency of the powers of life, the fever of reaction is too weak, the local disease is sometimes only partially removed, and passes into a chronic state: a deficient reaction is thus frequently the cause of inflammation being followed by changes of structure, such as indurations and effusions.

2. There is a form of constitution directly opposed to the sanguineous: it is chiefly characterized by weakness and irritability of the nervous system, and called the nervous temperament. This condition of the system is very obnoxious to inflammation, which, when developed, runs a much more irregular and unpropitious course than in the sanguine temperament. The constitutional symptoms of inflammation in this temperament are, as already stated, rather characterized by disturbance in the nervous system than by strongly increased vascular action, and the fever generally assumes a nervous, typhoid, or ataxic type. Another peculiarity of constitution which often accompanies the former, is a vitiated state of the blood, whose qualities have become altered, in consequence, probably, of some disorder in the functions of nutrition or sanguification. The combination of these two conditions of the system gives origin to the very worst forms of symptomatic fevers, called adynamic or putrid, in which to the most formidable nervous symptoms are united an extremely vitiated state of the secretions, and a great tendency of the blood and other fluids to rapid decomposition. There is sometimes a combination of the inflammatory and typhoid or adynamic forms of fever, exhibiting symptoms of high vascular excitement with great deficiency of nervous power; this is a complication of disease at-

tended with extreme danger, and requiring considerable tact and caution in its treatment.

The essential character of the irritability of temperament which predisposes to the preceding forms of constitutional derangement, is over-activity of the nervous system, combined with deficiency of the power of resistance. Irritability may be induced by deficiency as well as by excess of stimulus: a certain degree of stimulus is necessary to preserve the healthy tone of every living part: thus, if the retina be deprived of its natural stimulus by the long-continued exclusion of light, it becomes weak and irritable, and intolerant to that degree of light which was previously endured without inconvenience. An excess of stimulus, as in inflammation, produces exactly the same result. The stomach in the same way becomes weak and irritable by long abstinence from the use of meat and wine, and can only be brought back by slow degrees to tolerate even moderate quantities of stimulating food, as we see exemplified in convalescence after protracted acute diseases, and in all cases of long-continued starvation. When the privation of stimulus is carried beyond certain limits, instead of increased irritability, the sensibility becomes gradually weakened, until it is at last completely extinguished, and a state of torpor succeeds; the effect of long-continued over-stimulus is likewise to induce torpor, both extremes thus leading to exactly the same result. These illustrations of the opposite causes which may give rise to irritability, are susceptible of some important practical applications in the pathology of inflammatory diseases. There is no state of the constitution attended with so many complicated, obscure, and varying morbid phenomena, and so difficult to manage, as that which is characterized by either local or general irritability.

The irritability may be confined to one organ or to one function; it may be justly said that there is in every constitution some weak part more predisposed to disease than others; and this may be the result of original structure, or have been acquired by habits of life or previous disease.

In consequence of the great excitability of the nervous system in irritable habits, and want of power to sustain action, the sympathetic fever of inflammation is frequently characterized by a state of great over-excitement, followed by collapse. For example, the first effects of any serious injury or of the spontaneous development of inflammation in an irritable constitution may be a momentary state of depression, languor, or stupor. This, however, is, after a variable interval of time, succeeded by one or several paroxysms of rigor, sometimes very severe, which usher in the following train of symptoms: nausea, vomiting, and great irritability of the stomach; a dry brown tongue, parching thirst, obstinate constipation, scanty and high-coloured urine; præcordial anxiety and great restlessness; rapid pulse, either bounding or small, contracted, and irregular; burning dry heat of the skin; oppressed hur-

ried breathing with frequent sighing; flushed countenance; severe headach; contracted pupils and wild expression of the eyes; incoherence, amounting sometimes to fierce maniacal delirium requiring restraint; convulsive paroxysm, with great distortion of the features, not unlike epilepsy. This state is followed by one of considerable exhaustion, characterized by somnolency; sunk, haggard, and livid aspect of the countenance; profuse chilly and clammy sweats; small, irregular, fluttering pulse, rapid sometimes beyond reckoning; panting respiration; passive convulsions; hiccup and subsultus; coma and stertor, terminating in death.

The symptoms do not, however, always present this extreme degree of violence, nor lead so rapidly to a fatal result; they frequently assume the form of mild typhous or adynamic fever, characterized at one period by restlessness, anxiety, some headach, occasional low muttering delirium, moderate heat of skin, and frequency of pulse; the skin is covered with petechiæ, the tongue black and dry, the alvine evacuations vitiated and fetid; whilst at another period there are stupor, chilliness, slight convulsions and subsultus, and the usual symptoms of collapse. These various forms of constitutional derangement are especially distinguished by a rapid alternation of symptoms denoting contrary states of the system, and they derive their essential character, as before observed, from a state of excitement not supported by sufficient vital power to maintain and carry it through.

In this general state of morbid irritability, very slight causes of irritation give rise sometimes to the most violent constitutional disturbance, so that the general symptoms are not always proportionate to the extent of the local inflammation, nor a sure criterion of the degree of danger; the pulse may rise to 160, the heat of the skin be very high, and all the other symptoms usually indicating dangerous inflammation of some important organ, may be occasioned by only a trifling wound or furuncle, slight inflammation of the tonsils, or rheumatism of a joint. It is necessary, therefore, in forming a prognosis, not to be guided entirely by the general symptoms, but to take also into account the seat and extent of the inflammation. At other times, however, the local affection takes upon itself the impress, as it were, of the constitution; the inflammation is either exasperated and spreads rapidly, or it is partially suspended, or there is a complete cessation of vital action in the inflamed part, which becomes cold, livid, flabby, and sometimes gangrenous; these unfavourable changes have been frequently observed in extensive wounds after injuries or operations; in which cases no restoring process can be established so long as this disturbed state of the nervous function continues.

When, in the course of the salutary fever induced by common inflammation, any circumstance occurs to create severe disordered action of the nervous system, the regular

course of the fever is immediately arrested and completely changed, and a new train of symptoms, chiefly nervous, and of a more dangerous and destructive character make their appearance. This circumstance has led some pathologists to consider constitutional nervous irritation as a morbid condition of the system totally distinct from that which has received the name of fever. There appears, however, to be no good foundation for such a distinction, for the fever has merely assumed a new character, which corresponds exactly with that of the nervous, irritative, or typhoid fevers that have been frequently described by nosological writers.

The description of fevers under consideration attend some of the worst forms of inflammation, such as confluent small-pox, the malignant varieties of scarlatina and rubeola, several species of gangrenous inflammation, and especially hospital gangrene: this combination of local inflammation with constitutional typhoid symptoms is often extremely perplexing, presenting to the practitioner at the same moment the most opposite and contradictory therapeutic indications.

We have already stated that the nervous and irritative class of fevers are to be attributed either to constitutional causes, or to the seat, extent, and nature of the local inflammation. The following are some of the principal constitutional causes, which are extremely numerous:—great mental depression, arising from anxiety, grief, or the apprehension of death; exhaustion from over-exertion of mind, and particularly from excessive study and loss of sleep; or that consequent upon large evacuations, either by spontaneous hemorrhage, or copious bleeding and purging: an impure atmosphere; certain natural states of the body, such as that of pregnancy and lactation; the long continuance of organic disease, especially in the uterus, testicle, stomach, urinary bladder, or any of the large joints. One of the most common and active causes, however, is the abuse of spirituous liquors; the constitution of those who indulge to excess in the use of malt liquors, (as for instance brewers' servants,) is distinguished by a state of extreme plethora combined with nervous debility; and although apparently robust, they bear very ill the loss of blood, being soon affected with low delirium, partial convulsions, coma, and other symptoms of prostration. In habitual gin-drinkers the nervous system is so weakened by constant over-excitement, that they sink rapidly under a similar train of symptoms, from even slight inflammatory attacks. Over-activity and weakness of the nervous and vascular systems are predominant features of the constitution of infants and young children, and inflammatory symptoms rapidly attain in them a high degree of intensity, which is soon followed by an opposite state of collapse and sinking.

Individuals endowed with great nervous irritability, and particularly puerperal women, are sometimes subject to sudden attacks of acute pain in the head, chest, or abdomen, accom-

panied with considerable constitutional disturbance, bearing so strong a resemblance in several of its symptoms to active inflammation, that the affection has often been mistaken for either arachnitis, pleurisy, or peritonitis; it is a form of disease depending, however, entirely on nervous irritation, combined at times with some degree of active congestion. The disease sets in with rigor, generally more severe and lasting than in cases of inflammation; the reaction is proportionally violent and characterized by considerable nervous disorder and great irregularity in the course of the symptoms; there are frequent alternations from one extreme to another, differing in this respect from inflammatory reaction, which pursues its course more steadily. The general symptoms correspond with the description already given of the nervous and irritative forms of sympathetic fever, but it may be useful to offer a few observations on the local symptoms, for the purpose of defining more accurately the diagnosis of this affection from true inflammation, as it is sometimes rather obscure.

The affection of the head is characterized by acute general pain, great intolerance of light and sound, contraction of the pupils, vertigo, wakefulness, and delirium, sometimes even maniacal. This differs from arachnitis by the disease coming on more suddenly without any premonitory symptoms, and acquiring at once an extreme degree of violence; besides, in the latter the symptoms are less acute, and increase only gradually.

When the chest is affected, there is acute pain in some part, so severe as to check a deep inspiration; but the pain shifts its situation, shooting from one side to another, or towards the back; and if the patient be made to repeat the inspiration several times, the increase of pain becomes less and less; there is no cough or crepitus in making a deep inspiration, and the absence of all the signs of inflammation usually detected by the stethoscope will afford every information that can be desired for a correct diagnosis. There are, sometimes, severe attacks of palpitation and violent throbbing of the carotids, abdominal aorta, and all the large arteries.

The affection of the abdomen is denoted by acute pain and great tenderness on pressure, either confined to one part, or more or less diffused. There is as great an intolerance of pressure in some cases as exists in peritonitis, the more local pain resembling that of gall-stones. The distinction, however, from inflammation is established by the suddenness of the attack, the violence and irregularity of the general symptoms, and the severe sympathetic affection of the head, which very seldom occurs in peritonitis or enteritis.

The effects of the treatment will afford additional sources of diagnosis. The loss of blood is not well tolerated in this form of disease, depletion to a few ounces causing syncope; whilst, in the inflammatory affections alluded to, the patient can bear the abstraction of forty or fifty ounces of blood before fainting is in-

duced. Bleeding may sometimes appear to afford complete relief at the moment in cases of nervous irritation; but the paroxysm of pain soon recurs with equal if not greater violence; and it has persisted in some instances with unabated or increasing urgency, notwithstanding an enormous loss of blood. The symptoms on the other hand gradually yield to the use of purgatives and opiates, and of a light nutritive diet. In patients who have died of this affection no traces of inflammation have been discovered in any part of the body, and no other morbid appearance than at times a slight vascular injection of some of the organs.

This important form of disease had not been hitherto well understood; the profession is indebted for a good account of it to Dr. Gooch, and more especially to Dr. M. Hall.* It is attributed by the latter gentleman to intestinal irritation. This, no doubt, is very frequently the case, but we have traced it also to uterine irritation; and it may in some instances be referred to primary irritation of the brain, particularly in persons reduced to a state of great nervous exhaustion by any of the causes already mentioned. When excessive loss of blood by hemorrhage or bloodletting does not prove fatal through immediate sinking, it is sometimes followed by an excessive reaction resembling that we have just been considering, excepting only that the principal local affection is confined to the head, and there is a more marked tendency to subsequent exhaustion. We must refer for an excellent account of this latter affection to the article BLOODLETTING.

When inflammation occurs in constitutions in which an artificial plethora has been created by indulgence in the pleasures of the table, so that the functions of the different organs are oppressed by excessive repletion, the constitutional reaction is sometimes very feeble, the secretions are generally unhealthy, and the fever may assume a typhoid or adynamic character in consequence of this state of *indirect* debility. It is highly important to discriminate between a fever thus induced, and one of exactly the same character originating in *direct* weakness and nervous irritability. In the former case the debility being *indirect*, and the effect only of the oppression of the powers of life, the fever would be aggravated by the stimulating plan of treatment which in the latter case it may sometimes require; while, by disregarding the apparent debility, and having recourse to depletion and other active remedies, all the untoward symptoms are speedily removed, the character of the fever is transformed from typhoid to inflammatory, and both the local and constitutional affection pursue a more favourable course. It is in such cases that the pulse is found to acquire a greater degree of fulness, firmness, and regularity, under the repeated use of the lancet and the free exhibition of purgatives.

It was stated that the character of the constitutional symptoms was sometimes influenced by the *seat*, *extent*, and *form* of the local disease, independent of any predisposition of the constitution. Thus, with regard to *texture*, injuries of parts of little sensibility and low organization frequently induce a higher and more alarming degree of nervous irritation, than that of parts more largely endowed with nerves and bloodvessels; inflammation of the dense unyielding texture of tendons, ligaments, fasciæ, and fibrous membranes, especially of the periosteum, has already been mentioned as exciting an intense degree of local pain and tension. This generally gives rise to considerable disorder in the functions of the nervous system, while the constitutional excitement induced by the inflammation of mucous and serous membranes, or even of vital organs, more generally assumes the form of simple inflammatory fever.

The lesions of muscular and fibrous tissue, especially when the irritation is kept up by the presence of any extraneous body, are attended with a most severe degree of general irritation frequently ending in tetanus. Injuries or erysipelatos inflammation of the integuments of the head, chest, and abdomen, are followed by greater constitutional disturbance than those of other regions of the body, in consequence probably of contiguous sympathy. The inflammation of veins, which bear some analogy in their structure to fibrous membranes, is particularly characterised by symptoms of nervous and typhoid fever, and spreads rapidly along those vessels to a considerable distance. The injuries of nerves bring on most alarming symptoms of general irritation, being a frequent cause of convulsions and tetanus: this is chiefly owing to the propagation of morbid impressions along their branches, as they are rarely found inflamed. The ganglia of the great sympathetic form perhaps an exception, having been found by Mr. Swan intensely injected in cases in which the system had been strongly impregnated with mercury.*

With regard to the *form* of the local injury narrow and punctured are followed by more constitutional disorder than broad and open wounds: this frequently happens after the injury of some fibrous membrane or the puncture of a nervous filament, the complete division of which would have been of no importance. When the inflammation extends beneath a fibrous membrane, and suppuration takes place, the form of the wound not admitting of the discharge of the accumulated fluids, a considerable degree of tension and pain is the inevitable result. There may be for a time no local symptoms of the existence of the disease beyond a slight degree of tension and tenderness. When matter, however, is formed, a uniform diffused œdematous swelling, with ery-

* Commentaries on the Diseases of Females, by Marshall Hall, M.D., &c.; and Morbid and Curative Effects of Bloodletting, by the same author.

* Travers, Inquiry concerning Constitutional Irritation.

sipelatous inflammation of the skin, is observed round the margin of the wound, but without any distinct fluctuation; and this is accompanied with very violent constitutional disturbance, which can only be relieved by large and free incisions. The symptoms arising from the puncture of a nerve are more developed in the course of the nerve, and in the constitution generally than in the wound itself.

Contused and lacerated wounds, especially when of considerable magnitude, and attended with great destruction of parts, are necessarily followed by most serious and alarming derangement of the constitution. This is the case with gun-shot wounds, especially when important organs are injured and foreign substances remain within the wound; from the exposure also of muscles by the tearing away large flaps of skin; the denuding of an extensive surface of the cutis by burns and scalds; the extensive laceration, exposure, and crushing or comminution of the larger joints; the displacement and protrusion of the ends of fractured bones, with partial or complete divisions of great muscles and blood-vessels. There is considerable danger in these cases of the powers of the constitution sinking rapidly under the shock they have received, as will be mentioned hereafter; but a fatal termination may likewise take place from the violence of the nervous irritation leading to convulsions and tetanus; or from the gradual exhaustion induced by the erysipelatous, gangrenous, and sloughing inflammation which usually precedes the reparatory process in all such extensive injuries.

The constitutional symptoms are also frequently characterized by great nervous irritability and depression, low delirium, and convulsions, after severe operations, either for recent injuries or the removal of chronic diseases. Hence the great importance, whenever practicable, of attending carefully to the state of the patient's constitution previous to the performance of any serious operation.

Besides the seat, extent, and form of the injury, the nature of the exciting cause has also a powerful influence over the character of the general symptoms. This is particularly evident in the case of poisoned wounds, whether received in dissection, or from the bites of venomous animals. We have, in this class of cases, very striking and instructive examples of the most dangerous forms of constitutional affection from local disease.

The constitutional symptoms correspond with the description already given of the irritative and typhoid forms of fever, varying only in different individuals as to the relative degrees of reaction and collapse, to the combinations of severe nervous symptoms, with weak or strong vascular action, and to the more or less vitiated state of the secretions. In a case described by Dr. Duncan there was profuse dark-coloured clammy sweat of intolerable fetid and disagreeable smell, so abundant as to wet the bed-clothes and stain them of a dark colour. This diaphoresis was

critical, and it scarcely ever occurs but in cases that recover.

There are considerable differences, however, with respect to the local affection. In some cases the poisoned wound is exempt from external inflammation, the patient sinking exclusively from the action of the morbid matter on the constitution; sometimes there is the formation of a vesicle or pustule on the wound, followed by pain and inflammation of the cellular membrane of the arm, axilla, and thorax of the same side; or without any reaction in the wound, there may be severe pain and diffused swelling in the axilla and breast on the wounded side, followed by patches of a red diffused swelling and excruciating pain in distant parts of the body. In other cases there is violent reaction in the wound, leading to suppuration and gangrene in the tendinous sheaths of the finger or hand, accompanied with painful diffused erysipelatous swelling of the arm, axilla, and integuments covering that side of the body. Sometimes numerous vesicles, some of a considerable size, have formed on the inflamed parts, containing either a transparent serum or a dark-coloured fluid, the erysipelas round these vesicles assuming a dusky hue; and, lastly, the diffused inflammation of the cellular membrane on the arm or trunk has, in some instances, terminated in extensive suppuration and sloughing. The remarkable disposition shewn by the inflammation in all these cases to rapid extension, arises, no doubt, from its affecting tissues in which inflammation generally spreads by continuity, such as the absorbents, veins, subcutaneous cellular membrane of tendons, and fasciæ of muscles.* This is also owing in some measure to the erysipelatous character of the inflammation, which induced Dr. Good to give it in his nosology the name of *erythema anatomicum*.

The constitutional symptoms are chiefly to be ascribed to the introduction of the poison into the mass of the blood, whose qualities it vitiates and renders deleterious, and to the morbid action of this deteriorated blood on every part of the animal economy, and more especially on the vital organs; poisons have also been conceived to affect the nervous system in a more direct manner by the transmission of morbid impressions along the nerves. We have already stated that there are strong arguments and facts in support of each of these opinions, and that it is probable that the influence of both causes must to a certain extent be admitted.

It has been remarked that the constitutional affection is often as severe, and proves as rapidly fatal, in cases attended with scarcely any local affection, as in those in which whole regions of the body are engaged in inflammation. Extensive local disease is not therefore always so serious an aggravation as might at first be supposed; the danger is in propor-

* See Travers, Inquiry concerning Constitutional Irritation.

tion to the degree in which the poison has been mixed with the blood and has deteriorated its qualities, and to its paralyzing influence on the nervous power. It is generally considered that whenever the action of the poison can be confined either to the wounded or to any of the other inflamed parts of the body, by exciting in them inflammation of a healthy character, its pernicious influence on the constitution is considerably lessened, if not altogether prevented. Mr. Travers very justly observes, "Inflammation is not necessary to the most virulent and fatal action of the poison, and in general I should be disposed to say of these cases that the symptoms of local inflammation and constitutional irritation exist in an inverse ratio of severity."

A great many interesting cases illustrating the different forms of local and constitutional affection produced by poisoned wounds, are to be found in Mr. Travers' Inquiry concerning Constitutional Irritation—a work the most complete and valuable without exception yet published on the highly important subject of which it treats, and reflecting the greatest credit on the author's talent and observation.

The form of disease the most analogous to the preceding is that arising from the bite of the more venomous serpents, and especially of the rattle-snake (*crotalus horridus*, Lin.), and of the cobra di capello (*colubernaia*, Lin.); it only destroys life in a shorter time. The local and constitutional symptoms take place nearly simultaneously; the bitten limb swells instantaneously, and the inflammation shoots with great speed up its entire length to the axilla and shoulder; and if life continue long enough, it darts down the side over the pectoral muscle, and produces there the same kind of erythema as in the cases already described. The vital principle, however, is from the first suddenly exhausted, as if by a stroke of lightning; the blood ceases to flow in the smaller vessels of the swollen part, which feels deadly cold; the action of the heart is so weak that the pulse is scarcely perceptible; the stomach so irritable that nothing can be retained in it; dejection and horror overpower the mind, and the patient sinks with a low muttering delirium. Very powerful stimulants applied instantly may check the deadly influence of the poison, and sometimes produce a cure; but if life be sustained until the venom has exhausted its malignity, the debility is usually so extreme, and the sphacelus so extensive, that the unhappy sufferer often falls a victim to the local mischief. Dr. Mason Good, from whose Nosology the foregoing description is taken, gives an interesting account of the case of a man who died in St. George's Hospital, from the bite of a rattle-snake exhibited in London; he remarks that all other serpents have an immunity against each other's bite; but the rattle-snake not only kills every other, and even its own kind, but being so far

irritated as to inflict a personal wound has been found to kill itself.

The frightful assemblage of symptoms that characterize hydrophobia afford an example of the highest conceivable degree of over-excitement, and fatal disorder of the whole animal economy. One very remarkable circumstance connected with the action of the rabid virus is the great length of time during which it has in some cases remained dormant in the constitution before taking effect; it is difficult to account for this long period of incubation of a virus that proves so rapidly destructive after it begins to operate. The invasion of the constitutional symptoms is sometimes accompanied with slight pain and inflammation of the wounded part; but the local affection is never severe, and in some cases completely wanting.

In all the preceding cases there have been very few traces of disease found after death, beyond those resulting from the local inflammation; the only morbid appearances ever observed have been partial vascular injections in some of the internal organs, and this only in a small proportion of cases. A high degree of injection of the medulla oblongata and pharynx is stated to have been found in some cases of hydrophobia.

3. The third modification of the constitutional derangement induced by local irritation or inflammation in the irritable temperament, is that of sinking without reaction. The symptoms of this state of sinking are not unlike those of a prolonged fit of syncope, only more severe. The patient first experiences a degree of vertigo followed more or less quickly by gradual loss of consciousness. This, however, is sometimes only partial, there being rather a tendency to drowsiness, from which the patient can be momentarily roused by any strong and sudden impression; he is also affected with a sensation of shuddering, considerable degree of universal pallor, contraction and coldness of the surface, and particularly of the countenance; the pupils are dilated; the breathing is short, at one time almost imperceptible and only carried on by the diaphragm, or at another interrupted by short irregular sighing; the pulse is slow, feeble, or indistinct; the tongue and fauces are dry, the stomach is irritable, and vomiting sometimes procures relief by creating a general reaction. When, however, this is not the case, other more formidable symptoms make their appearance; the pallidness, collapse of the countenance, and coldness of the surface, increase; the breathing becomes more oppressed, and is attended with a peculiar crepitating noise; there is restlessness, jactitation, and delirium, followed by coma, convulsions, relaxation of the sphincters, and stertorous breathing ending soon in death.

The symptoms offer, however, many variations; in some cases the patient falls so gradually into a state of apparently quiet sleep, as not to excite any suspicion of danger; but this is succeeded by stupor, and he dies with-

out any struggle. In other cases, he is affected with delirium, restlessness, and frightful convulsions. Convulsions, however, may appear without delirium or coma, the latter being of most frequent occurrence in infants. When sinking does not terminate in death, it is followed by either partial, excessive, or healthy reaction. In slight and temporary syncope, returning animation is indicated by the gradual restoration of warmth on the surface, with occasionally a gentle moisture of the skin; the breathing becomes more full and free; there is deep sighing and sometimes hysterical sobbing; the pulse recovers its fulness and strength; and consciousness gradually returns as if the patient were awaking from sleep.

In the state of more severe sinking reaction is generally ushered in by rigor: a state of great depression of the nervous energy has the effect of lowering the action of the heart, and causing a gradual accumulation of blood in the central parts of the body, while the circulation is diminished in the capillaries of the surface and extremities. This unequal distribution of the circulating fluid impedes the action of the two most important vital organs, until the constitution, unable to bear any longer the irksome oppression, is roused to a convulsive effort, in order to remove the obstacles opposed to the circulation and respiration. The commencement of this effort at reaction is indicated by rigor, and sometimes also by vomiting and hiccup; the action of the heart is immediately increased, and the reaction becoming general, leads to a restoration of the circulation and heat of the surface, to a relief of the embarrassed breathing, and to a revival of the depressed energies of the brain and nervous system. If these changes take place without violence and are sustained for some time, a permanent healthy reaction is established; they may, however, be only momentary, in consequence of the insufficiency of the nervous power to keep up reaction, and the patient sinks again into collapse. Rigor of long continuance without any return of heat, or frequently recurring, indicates likewise a want of power in the system. At other times the reaction may be too strong, and lead to a condition of the system opposite to sinking,—that of over-excitement. The shudder which accompanies shock differs from rigor: it is a cerebral affection of short duration, produced by a painful impression of the mind, and it is not necessarily connected with any change in the temperature of the body.*

It is of great practical importance that the distinction between these opposite morbid conditions of the system should be well understood, and the changes from the one state to the other require to be watched with the utmost vigilance; for the treatment which may be the means of restoring life during the period of sinking, might prove destructive during that of reaction. The rule laid down by Mr.

Travers, of maintaining action without forcing action, should be constantly borne in mind; the effect produced by stimulants must also be carefully observed, in order that they may be laid aside as soon as reaction has taken place, and opposite measures should then be adopted if required.

The state of sinking is brought on by all causes tending to depress considerably the nervous power. Nervous weakness being the chief characteristic of an irritable constitution, it is strongly predisposed to this form of disease. The effect of sudden and painful emotions on weak and irritable persons in causing syncope and convulsions is well known, and has even proved fatal in individuals much exhausted by disease. The breathing of putrid and pestilential effluvia has sometimes caused such a degree of faintness and sinking that life has been extinguished before reaction could take place. Individuals have died in the cold stage of the algid fever from a similar cause. Several powerful narcotics, by completely paralyzing the action of the brain and nerves, and probably also that of the heart, prevent all reaction, and destroy life with amazing rapidity. Patients who have been much exhausted by long and painful inflammatory affections, sometimes sink unexpectedly at the moment they were considered convalescent. Some of the cases of sudden and unexpected death that take place without any known cause during attacks of severe illness, may reasonably be accounted for in this manner. Profuse hemorrhage is a frequent cause of sinking, especially in puerperal women, whose vital powers have been much lowered by the sufferings of tedious and painful labour: the sinking in these cases is often attended with frightful convulsions. Among the frequent causes of sinking is to be reckoned the sudden shock the constitution receives from severe injuries, which operate in this way either in consequence of their extent or of the tissues that are affected; as, for instance, when many textures are implicated in a wound, and extensive portions of skin detached, or when joints and tendinous structures are lacerated, and large bones comminuted.

The effect of extensive burns in causing direct prostration is very remarkable; the great sensibility of the skin as the organ of tangible impressions, the importance of its functions as a secreting surface, and its numerous sympathies with all the vital organs, will sufficiently account for the system receiving a severe shock when it is extensively injured. The danger is greater when the burn is seated on the integuments of the trunk than on those of other parts, in consequence, probably, of contiguous sympathy. The tendency to sinking may continue for the first three days after the accident; but at the end of this period reaction is generally established. The situation of the patient is very analogous to that of a person stunned by a fall; he is in a state of apathy bordering on stupor, without actual loss of consciousness; there is an absence of all pain, as if the sensibility had shrunk

* Inquiry concerning Constitutional Irritation, by B. Travers, Esq. p. 138.

below the point of pain. The complaint of pain is, therefore, rather a favourable sign; continued shivering is completely the reverse.

The shock the brain receives in concussion brings on symptoms of sinking; the stupor resulting from other casualties is the effect only of functional disorder, while that arising from injuries of the head is generally connected with physical derangement of the organ: in the latter case, when reaction takes place, there is much greater reason to apprehend and guard against cerebral inflammation than in the former.* Children are sometimes affected with sinking after excessive evacuations; this is chiefly indicated by a tendency to stupor and coma, which has often been mistaken for hydrocephalus. Full details respecting the diagnosis and treatment of this important affection will be found in the article *HYDROCEPHALUS*. The shock inflicted by the pain of a severe operation often brings on sinking, especially if the vital powers have been previously depressed by recent injury or painful chronic disease, or else if the patient has been under great dread of the operation, or much alarmed at the prospect of death.

Severe and intense pain is of itself destructive. Puerperal women have sunk after difficult and protracted labour, from the mere paralyzing effect of intense and long-continued pain; ruptures of the stomach, gall, and urinary bladders are sometimes productive of such sudden and excruciating pain as to bring on rapid and fatal syncope. The effects of severe pain are variable: the sudden infliction of intense pain may be instantly followed by such a degree of direct general torpor that the individual appears as if completely stunned, and little or no pain is afterwards experienced. When intense pain is long endured, it absorbs every other feeling, and induces a remarkable degree of insensibility to all surrounding impressions. Severe pain at other times brings on delirium, convulsions, vomiting, suspension of the secretion of urine, and other symptoms of over-excitement; but this is of short duration, and is soon succeeded by a state of exhaustion and torpor. Long-continued pain impairs all the operations of life, and gradually exhausts the vital principle itself; so that pain has been justly called the greatest sedative in nature. The sudden remission of intense pain has sometimes been followed by syncope and death.

Very intense pain of an unimportant part is sometimes well tolerated; while slight pain of a vital organ or highly sensitive part, such, for instance, as the urethra, may be sufficient to cause syncope. The constitution in some cases becomes accustomed to the impression of moderate pain, when frequently repeated or long-continued; the susceptibility to all impressions, whether pleasurable or painful, being lessened by habit. When the pain of inflammation is so intense as to constitute its most prominent symptom, and has not yielded to full depletion, the in-

flammation is sometimes kept up by the continuance solely of the pain. It is of great importance in such cases to subdue the pain at once by means of large opiates; we have seen attacks of peritonitis attended with violent pain yield immediately to this plan of treatment.

We shall conclude this short account of the various acute forms of constitutional derangement that are induced by inflammation, with the following concise and at the same time comprehensive remarks of the great Hunter:—"Nature requires to feel the injury; for where, after a considerable operation, there is rather a weak, quiet pulse, often with a nervous oppression, with a seeming difficulty of breathing, and loathing of food, the patient is in a dangerous way. Fever shews power of resistance; the other symptoms shew weakness sinking under injury."*

Local inflammation may go through its different stages without any interruption, except a certain degree of exacerbation and remission in its symptoms at different periods of the twenty-four hours. But inflammation is also sometimes intermittent, and even periodical, and the constitutional symptoms in these cases follow the order of the local symptoms. There is a greater tendency to periodicity and intermission whenever the nervous system is much affected.

The order in which the constitutional symptoms occur with respect to the local symptoms is variable. In some instances they precede the local, as in the whole class of exanthematous diseases, and often also in erysipelas. In most inflammatory affections arising from external injury, the febrile symptoms succeed to the local at a longer or shorter interval of time, according to the seat and severity of the injury, and the susceptibility of the constitution. In some very severe injuries, as for instance in extensive burns, the local and constitutional symptoms appear almost simultaneously; the same is often observed in severe inflammation of the pleura and peritoneum.

There are also differences between the local and constitutional symptoms with respect to their relative degree of violence. The febrile symptoms, as before observed, run sometimes so high that they completely conceal the local affection; and they may assume so formidable an appearance, either from their violence or malignity, as to constitute the chief source of danger. Inflammation is sometimes excited in distant organs by sympathy with the organ first affected, and the secondary inflammation becomes stronger than the primary, so as to completely supersede it; in which case a new disease is established. If, however, inflammation proceeds in two organs at the same time, the additional disease, although even slight, increases considerably the danger, particularly if the constitution has been much impaired by the first inflammation.

The organs the most subject to be affected

* For a full account of the phenomena of shock, &c. see Travers, *op. cit.*

* Treatise on the Blood and Inflammation, ch. iv. s. 6.

with sympathetic inflammation are the brain, the lungs, the alimentary canal, and sometimes the skin. There are often more severe sympathetic pains in other organs than in the inflamed one, these pains being chiefly of a nervous character: this is particularly the case in inflammations of the mucous membrane of the alimentary canal and urinary bladder, and also in nephritis. Gastro-enteritis is frequently attended with severe pain in the head and loins, or violent cramps and pains in the lower extremities, while very little pain is felt in the stomach and bowels: this accounts for the original disease in these cases being so frequently overlooked. Severe pain in the stomach is one of the common symptoms of nephritis. There is a remarkable tendency in some varieties of inflammation to change frequently their position through the influence of sympathies; this peculiarity is frequently observed in erysipelas and rheumatism, and in the inflammation of the parotids called *mumps*, which is often superseded by inflammation of another organ, as the brain, the testis, or mamma. This erratic tendency of inflammation will be more fully considered when treating of metastasis.

Idiopathic, or essential, and symptomatic fever have been considered by some pathologists as differing materially in their nature. There does not, however, appear to be any reasonable ground for this distinction. Inflammation is frequently the exciting cause of fever; but, on the other hand, inflammation often occurs in the course or towards the decline of fever as one of its consequences. The primary morbid phenomena essential to the existence of fever—a disturbance in the functions of the heart, the brain, and the stomach—are always the same, whether arising from a deteriorated state of the blood, from external morbid impressions acting on the brain and nervous system, or from sympathy with a diseased organ. These exciting causes may possess different degrees of activity, create a greater disturbance in one order of functions than in the others, and be single or combined in the same case; and hence the variations observed in the character, severity, and course of the symptoms by which the different types of fever are distinguished. When an inflamed organ is the exciting cause, the fever subsides as soon as the inflammation is subdued. When a vitiated state of the blood is the cause, the fever likewise subsides as soon as the blood has recovered its healthy qualities. When both these causes are combined in the same case, although the local inflammation may be quickly removed, the fever pursues its course until the blood also is restored to its healthy condition. We have in each of these cases the same primary morbid phenomena, differing only in degree, and in being variously combined according to the nature, activity, and combinations of the exciting causes.

Before concluding our remarks on the different forms of symptomatic fever, we have to notice some peculiarities in the state of the pulse and in several of the other symptoms, deserving of attention. The character of the

pulse varies not only with the intensity of the inflammation and type of the fever, but also according to the particular organ or structure affected. The pulse of common acute inflammation is generally characterized by fullness, hardness, and moderately increased frequency. In the inflammation, however, of some of the abdominal viscera, such as the stomach and intestines, the pulse is small, contracted, wiry, and rapid; there is also a remarkable degree of sinking and general prostration of strength, the consequence probably of the extensive sympathies of these organs with the brain and spinal marrow, through the medium of the ganglionic nerves. These two peculiarities in the symptoms might possibly mislead, if not well understood, with respect to the true nature of the complaint, and prevent the adoption of those active measures by which alone the patient can be saved; the usual effect of free depletion in these cases is to increase the fullness and strength of the pulse; this variety of the pulse has been called *abdominal*, as it is seldom observed in inflammation of the organs of other cavities; it does not either attend the inflammatory affections of all the abdominal viscera, but more particularly the inflammations of the digestive tube, especially when seated in the peritoneal coat and various prolongations of that membrane.

The character of the pulse is likewise influenced by the particular structure affected. In the inflammation of serous and fibrous membranes, and in most cases of inflammation attended with intense pain, the pulse is in general contracted, hard, wiry, and very frequent; whilst in inflammations of the cellular tissue, of mucous membranes, and of parenchymatous and glandular organs, the pulse is usually fuller softer, and less rapid; in diarrhoea the pulse, as is well known, is sometimes intermittent. The frequency of the pulse, instead of being increased, may be reduced below the standard of health, notwithstanding the existence of severe and dangerous inflammation; this arises generally from some affection of the brain, lessening the general susceptibility of the system, and preventing the free development of the constitutional symptoms. In the inflammation of muscular and fibrous tissues, there is a very high degree of heat, and great frequency of pulse, followed by profuse and long-continued perspirations; the degree of danger, therefore, as before stated, is not always in proportion to the severity of the general symptoms.

We have hitherto been considering the various forms of constitutional affection arising from *acute* inflammation. We have next to describe the constitutional derangement that attends *chronic* inflammatory diseases, and which differ from the preceding in several points of considerable importance.

Constitutional symptoms of chronic inflammation.—The term chronic inflammation implies the absence of acuteness and activity, and a tendency to long continuance. Inflammation may be of a mild and obscure character from the beginning, or else it may have been acute

at first, and have subsequently assumed a mild and *chronic* form. If after acute inflammation has reached its height, it is not brought to a speedy termination, or is only partially removed, it has a great tendency to become chronic. Both the local and general symptoms of chronic inflammation differ in several respects from those of acute, and require also some important modifications in the mode of treatment. We shall first briefly consider the principal differences observed in the local symptoms, as they will assist in explaining the modifications of the constitutional symptoms.

The local symptoms are never so strongly marked, and are sometimes, indeed, so obscure as to be perceptible only to the scrutinizing eye of an experienced observer; there is but a very slight degree of pain, seldom much heat or redness, and sometimes but little swelling. The functions of the inflamed organ are more or less disturbed; in some cases the functional derangement is remarkably slight, notwithstanding the existence of extensive organic disease; the secretion of bile has often continued healthy in livers considerably enlarged and thickly studded with tubercles; the respiratory function has not been very sensibly affected, although a vast abscess has been found in one of the lungs. When the progress of the inflammation has been very slow and circumscribed, so that the remaining portions of the organ have preserved their healthy condition, and the constitution has been able to adapt itself gradually to its diminished activity, the local affection is not aggravated by any strong general re-action.

Mild cases of chronic inflammation excite very little general disturbance; this is sometimes limited to a slight loss of flesh and decrease of the general strength, and is also characterized in some cases by a change in the colour of the skin, which becomes either pale or sallow. The severer cases are attended with various degrees of febrile excitement, never amounting to the regular continued fever of acute inflammation, but occurring in paroxysms with variable intervals of more or less complete remission. During the latter part of the day, or first hour of the night, the patient experiences a sensation of general uneasiness, languor, and sometimes chilliness, followed by headach, frequency of pulse, heat of skin, dryness of the mouth, and thirst; these symptoms continue until morning, when they subside either with or without perspiration. There are frequently conjoined with the preceding, a variety of nervous symptoms, especially in chronic inflammation of the liver and uterus; and the local affection not being detected, the disease has been often treated as purely nervous. When the disease lasts for any considerable time, the general health becomes materially impaired; the patient is affected with progressive emaciation, or sometimes partial dropsy, and dies in a state of marasmus. If the inflammation leads to suppuration, symptoms of regular hectic fever make their appearance.

The progress of chronic inflammation is

generally marked by many variations, the symptoms being at one time slow and obscure, or to all appearance so completely removed as to excite hopes of recovery, and increasing suddenly at another time without apparent cause. Chronic inflammation is prolonged in some cases by a frequent repetition of the exciting causes, such as irregularities of diet, exposure to cold, &c., or its continuance may depend on the weak and irritable state of the constitution. One circumstance important to be remembered, is the strong tendency of chronic inflammation to assume an acute form, from the influence of even very slight causes. This passage of chronic into acute inflammation is generally attended with considerable danger; for an organ of which the structure has been previously weakened or perhaps materially altered, is little able to resist the effects of acute disease. Sometimes, however, the supervention of acute inflammation has been the means of removing chronic disease of long standing, as is often the case with chronic sores and swellings.

Chronic inflammation has, in some cases, been quickly removed on the sudden appearance of some other more general affection, such as a cutaneous eruption, rheumatism, gout, &c.; it seldom terminates in gangrene, but most frequently in the thickening and induration of textures, the formation of false membranes; or in adhesions, ulceration, sero-purulent effusions, ossification, or the formation of new tissues. When acute inflammation is on the decline, the danger of rousing anew excessive action by the premature exhibition of stimulating diet or medicines is generally understood; there is, however, another risk at this period which is not unfrequently overlooked. When the strength of the patient has been reduced beyond a certain point, by too long a perseverance in the use of active remedies and of low diet, there may not be sufficient power for the establishment of the restorative process, and the inflammation may assume from this cause a chronic and unhealthy character; this is particularly liable to occur in old or weakened subjects. The study of this class of inflammations is of considerable importance, and a great deal of valuable information on the subject will be found in the works of Pujol and Broussais.*

Progress and duration of inflammation.—The progress of inflammation, with respect to its more or less favourable course, is influenced by the structure, situation, and state of the part affected, by temperament, hereditary disposition, diathesis, age, sex, habits of life, quality of the air, climate, &c. We shall offer a few remarks on the influence of each of these circumstances.

It is observed, with respect to *structure*, that in highly organized and vascular parts, in those in which the circulation is vigorous from their vicinity to the heart, and endowed with a strong nervous energy, inflammation is generally more disposed to run a speedy and favourable course, than in parts of an opposite

* *Histoire des Phlegmasies Chroniques.*

structure, or more remote from the centre of the circulation. Hence inflammation of the skin, cellular tissue, and muscles goes more rapidly through its different stages, whatever be its termination, than the same affection in bones, tendons, fasciæ, and ligaments; when parts possessing a low vitality are preternaturally excited, they frequently mortify, not having sufficient power to resist the disturbance of the inflammatory action. The lower parts of the body are, for the above reasons, more prone to inflammation, and when inflamed recover more slowly than the superior parts; a depending position retards also the curative process by impeding the return of the blood through the veins. The inflammation of vital organs, although they are very vascular, often takes an unfavourable course, on account of their extensive sympathies giving rise to severe constitutional reaction.

One of the remarkable and important laws of healthy inflammation is that of its being always most actively developed on the side of the part affected which is nearest to the external surface, or to some outlet: this is beautifully exemplified in the pointing of abscesses; if seated under the skin, or in the muscles, the walls of the abscess become thinned by absorption on the side nearest the skin, and the pus tends to make its way to the surface; or if seated near the intestines, the pointing takes place towards the cavity of the bowel. It is thus that foreign substances are sometimes cast off, after remaining even for years lodged in some parts of the body,—a passage being gradually made by the spontaneous development of inflammation on that side of the substance only which is nearest the surface.

With regard to the *state* of the part, whenever it has been previously weakened by inflammation, it is more predisposed to a return of disease, and each attack lessens the chance of a complete and permanent recovery; thus persons who have suffered from severe injuries of the head are sometimes rendered delirious by stimulating food, or taking the smallest quantity of any spirituous liquor. When the circulation of a part has become languid, in consequence of the ossification of its vessels or of paralysis, there is not sufficient power for the perfect development of the inflammatory process, and it often terminates in mortification. All new formed parts, such as encysted or sarcomatous tumours, excrescences, granulations, cicatrices, false membranes, callus, &c. having only a low degree of vitality, cannot long resist inflammatory action, and are soon destroyed either by ulceration or sloughing.

We have already adverted to the influence of *temperament* over the constitutional symptoms; the local character of inflammation is also considerably modified by diversities of temperament: thus the sanguine temperament is predisposed to acute inflammation of highly vascular organs; the bilious temperament to erysipelas, &c.

Inflammation is greatly modified also by the *diatheses*, or morbid predispositions, and in many cases these morbid states of the constitu-

tion give the inflammation a specific character: thus the scrofulous, rheumatic, and gouty diatheses, whether natural or acquired, give origin to as many corresponding varieties of inflammation, as will be more particularly specified hereafter. Many peculiarities of constitution are transmitted from parents to their progeny; these hereditary morbid tendencies are likely to be brought into action, if the individuals be placed in circumstances favourable to the development of the diseases which they induce; otherwise they may long remain dormant in the constitution, and sometimes even, after passing over one or two generations without manifesting themselves, may break out in the third.

The progress of inflammation is materially affected by *age*, in consequence of the changes in the activity of the circulation and distribution of blood, and in the energy of the nervous system observed at the different periods of life. In *childhood*, the circulation being very active, the inflammatory process is always rapid and mostly healthful; but the great determination of blood to the head, peculiar to that age, occasions a more than ordinary tendency to inflammatory affections of the brain and other parts about the head, such as hydrocephalus, ophthalmia, otitis; to mumps, and other glandular swellings of the neck; to cyanche, cutaneous eruptions of the scalp, &c. The inflammatory affections of children are frequently attended with convulsions, owing to the great susceptibility of their nervous system. Another peculiarity by which these affections are distinguished is their remarkable disposition to assume either a remittent or intermittent form; this may perhaps be also attributed to the irritability and weakness of the nervous system in childhood. In *youth*, the progress of inflammation is still more vigorous and healthful, but the tendency to affections of the head diminishes, and the thoracic viscera become more prone to inflammation; accordingly pneumonia, pleurisy, and phlegmonous inflammation, are observed to prevail at that age. In the *adult* period of life, inflammatory action appears more particularly directed towards the abdominal viscera, giving rise to attacks of gastritis, enteritis, hepatitis, nephritis, cystitis, &c. In *old age*, as the powers of life decline, the energy of the vascular system becomes weakened, and its organization is frequently impaired; the inflammatory action is therefore much more languid, and less disposed to terminate favourably; this unpropitious tendency is often increased by the pre-existence of visceral disease. This period of life is also characterized by weakness and irritability of the nervous system. The most common inflammatory affections of old people are chronic catarrh, peripneumonia-notha, chronic cutaneous eruptions, gangrenous erysipelas, &c.

The influence of *sex* is to be considered. The greater delicacy of fibre and higher degree of nervous susceptibility of females, predisposes them more to inflammation than men; although this is in some measure counterbalanced by males being more exposed to the influence of

the exciting causes from the nature of their pursuits and their irregular habits of life. The course of inflammation in women is more rapid and less steady than in men, being complicated with many nervous symptoms: their inflammatory affections are also greatly modified by the influence of the uterine functions.

The *habits and condition of life* are likewise deserving of some consideration. In persons of sedentary habits, or who indulge in food and liquor to excess, inflammation is generally severe, and often assumes an unhealthy character, in consequence of the repletion of the system and vitiated condition of the fluids. When the body has been much debilitated by a deficiency or the bad quality of the food, previous disease, or any other cause of weakness, the inflammation is languid, and there is not sufficient power to establish any reparatory process; hence the great difficulty often experienced in such cases in obtaining the reunion of fractured bones, the healing of ulcers, or resolution of tumours, &c. There are also peculiar forms of inflammation induced by particular employments; as, for instance, the chimney-sweepers' cancer, the bakers' and grocers' itch, the barrel-grinders' cough, &c. an excellent account of which will be found in the article *ARTISANS, DISEASES OF*.

The effects of *air* on the progress of inflammation are very remarkable, and entitled to particular attention. They are to be attributed chiefly to the important influence of the air over the qualities of the blood and vigour of the circulation. A pure air imparts to the blood rich and nutritive properties, and acts as a stimulus to the circulation, so that wholesome materials are supplied, by which the inflammatory processes are carried on with activity to a favourable termination; in an impure and foul air, the blood is impoverished or vitiated, the circulation feeble or irregular, and all the morbid actions necessarily partake of this deficiency of power. The air exerts moreover a powerful and direct influence over the nervous system, and through it on all the functions of life, especially those of the digestive organs, and of the skin. These reasons sufficiently account for the slow progress of inflammation, and the unhealthy character it so frequently assumes in close ill-ventilated apartments, low situations, cold and damp seasons, or during the prevalence of certain winds; and likewise for the remarkable improvement observed after the removal of patients to a more airy situation, by transferring them even from a lower to an upper floor in the same building, and after favourable changes of weather. It has been justly remarked by Mr. James,* that there is no poison more injurious than foul air, and no restorative more effectual than pure air; indeed it exercises in this respect a greater influence than even food. The effects of the damp and foul air of ill-ventilated wards in causing the disease called hospital gangrene, have been frequently noticed by practical writers.

Besides these general effects of air, there are certain regular and periodical changes produced in the human constitution by the different seasons, which considerably modify the character and course of inflammation; these changes seem to depend partly on the circumstance of each season causing a greater determination of blood towards certain organs than others. We thus see inflammatory diseases most prevalent during winter and spring: pneumonia, inflammatory catarrh, and acute rheumatism are principally diseases of winter: pleuritis, cerebral inflammation, the febrile exanthemata, and other acute diseases of the skin, are the general concomitant affections of spring. In summer and autumn there appears to be less predisposition to very acute inflammation, and the predominant diseases of these seasons are congestions and sub-acute inflammations of the liver and mucous membranes of the alimentary canal, such as bilious fever, gastro-enteritis, dysentery, diarrhoea, and cholera morbus. During the prevalence also of epidemic diseases all local inflammations are observed to partake more or less of the type of these diseases. If it be inflammatory, the local diseases are very acute; if typhoid, the local inflammation is of a low type. Some epidemics create a remarkable tendency to erysipelatos inflammation, and when the epidemic has either a remittent or intermittent type, the most common inflammations show a remarkable tendency to assume the same character. This influence of epidemic constitutions over local diseases has been well described by some of the ancients, and especially by Sydenham and Stoll.

The *duration* of inflammation varies according to its intensity, the texture of the part affected, nature of the exciting cause, and state of the constitution. Violent inflammation is seldom of long duration; it may exist for only a few hours, and has sometimes proved fatal in the course of a day; it passes through its different stages with great rapidity in infants, who require on that account to be visited frequently when labouring under inflammatory affections, as considerable changes may take place in the course of even a few hours; it may also prove rapidly fatal when affecting vital organs, such as the heart and brain, particularly if attended with excruciating pain. When inflammation is not violent, it may last for months, and even years; this difference in duration forms the ground of one of the divisions of inflammation that will be presently examined. Inflammation, when of long continuance, frequently induces changes of structure. One of the effects of long-continued inflammation is to leave the vessels so much weakened that they remain preternaturally dilated, and the part preserves a certain degree of redness and thickening which may not disappear for years; this happens particularly in the cicatrices and scars consequent upon burns and old ulcers.

Varieties and divisions of inflammation.—The variety of forms assumed by inflammation are extremely numerous, and have been arranged under some classification or other by

* James on Inflammation, p. 80.

most practical writers. But in the present state of pathological knowledge we are too imperfectly acquainted with the exact nature of proximate causes, and with many other important circumstances relating to the history and theory of diseases, to be able to frame any truly scientific nosological arrangement, and all the classifications of inflammation are on that account more or less defective. They are deserving, however, of some notice, as tending to give a systematic view of the most important peculiarities of inflammation, and as affording some assistance in the study of this multifarious class of diseases, and in laying down general rules of practice.

Inflammation has been divided into *acute* and *chronic*: it is important that these terms should be understood as expressing only different degrees and not different kinds of inflammation. The term *acute* is generally used to denote that the inflammatory process is both active and of short duration: it may be considered sufficiently accurate in the former sense, but will often prove incorrect in the latter; for inflammation is susceptible of being maintained in a state of great activity for a considerable length of time, especially if the exciting cause continues in operation, or its application be frequently renewed. *Chronic* inflammation implies the absence of acuteness or activity, and a tendency to long duration. When acute inflammation is only imperfectly relieved, it often continues for a considerable time in a state of lessened activity, and is then chronic in every acceptance of the term; but inflammation may be of an obscure and mild character from the very beginning, and it cannot therefore be correctly called chronic from the mere absence of acuteness. An intermediate degree of inflammation between the acute and chronic has been termed *sub-acute*; this frequently consists of the state we have described by the name of congestive irritation.

Inflammation has also been divided into *active* and *passive*: these terms designate merely the degree of intensity of the inflammatory action, and are not exactly synonymous with acute and chronic; for passive inflammation may be of short duration, whilst active inflammation may, as already stated, be more prolonged. When the pain, redness, and heat are only slight, while the swelling is considerable and attended with an abundant secretion, the inflammation is said to be passive: this form of affection ought rather to be considered as a species of congestion; and the term passive can scarcely be applied with strict propriety to any species of true inflammation. Inflammation is sometimes distinguished into *tonic* and *atonic*; these terms refer more to the powers of the constitution than to the intensity of the local disease. When the constitution is strong, the inflammation is called tonic. If the constitution be in a state of debility, there may be very violent inflammation in a part; but in consequence of the want of sufficient power in the system to maintain this local action, it soon subsides; and the inflammation either disappears, as is seen in atonic gout, or perhaps

mortification takes place. This is called atonic inflammation. The terms *sthenic* and *asthenic* have also been applied to inflammation; they are derived from Dr. Brown's well known division of diseases into two great classes, and refer, like the terms tonic and atonic, to the powers of the constitution; sthenic being used to express a high degree of power, and asthenic a deficiency of power.

In order to avoid the ambiguous and ill-defined notions generally conveyed by the terms active and passive, acute and chronic, &c. as applied to inflammation, Andral has adopted a new and very simple division. He classes all inflammations and congestions under one head, termed *hyperæmia*, or excessive presence of blood in the part. When the accumulation of blood is due to increased action, this constitutes *active hyperæmia*, including all forms of active congestion and inflammation. When, on the contrary, the accumulation of blood arises from debility or obstruction, &c. it is called *passive hyperæmia*, which comprehends passive congestions. Andral's division has still, however, the disadvantage of applying the same name to diseases very dissimilar in their characters, such as, for instance, every variety of active congestion and inflammation; besides, moreover, the great inconvenience always attached to the introduction of any new nomenclature in science. It appears, therefore, more desirable to adhere to the old terms, endeavouring only to give them a more precise meaning.

Inflammation may be *continued*, *remittent*, or *intermittent*. Acute inflammation in healthy constitutions endowed with sufficient power to maintain vigorous action, assume most generally the continued form. We have already stated, in speaking of the influence of age, that the inflammatory affections of children exhibit a great tendency to remittance or intermittence; and that the same peculiarity is sometimes observed in persons of an irritable temperament or advanced in life. We have instances of intermittent inflammation in ophthalmia, which sometimes returns very violently every evening, or every other evening, at a certain hour. Otitis is frequently intermittent; and catarrh has also occasionally assumed a periodical character.*

Next to the duration and different degrees of intensity of inflammation, its causes have also been adopted as the basis of several divisions. Inflammation considered in this point of view has been distinguished into *accidental*, *spontaneous*, and *symptomatic* or secondary.

Accidental inflammations are those arising from *mechanical* causes, such as pressure, friction, cutting, and lacerating instruments, &c. or *chemical* causes, including all irritating, acrid, and corroding substances, high degrees of temperature, and great cold: all these causes excite inflammation in the part to which they are applied; but the inflammation arising from cold often manifests itself at a distance from

* Elliotson's Lectures on Inflammation, Med. Gaz. Dec. 1831.

the part on which the cold has acted. In accidental inflammations the local symptoms generally precede the constitutional, and the latter follow, with respect to their increase or decline, the course of the former.

Spontaneous or idiopathic inflammations are those which cannot be distinctly traced to the action of any external agent, and appear to derive their origin from various morbid conditions of the constitution, such as a state of general or local plethora, the over-excitement or deficient action of certain organs, &c. Spontaneous inflammations are susceptible of being influenced to a certain extent by peculiarities in the state of the atmosphere, the exact nature and mode of operation of which we are unable to explain. That such, however, is the fact is clearly proved by the circumstance of this class of inflammations assuming sometimes an epidemic form, which constitutes a good line of distinction from the preceding class.

Symptomatic or secondary inflammation.—It has already been observed, when describing the constitutional symptoms, that whilst inflammation was frequently a primary cause of great general disturbance in the animal economy, it was also on many occasions only symptomatic of a previously disordered state of the constitution; the inflammation appears then as a symptom only of another more general disease. Among the causes of symptomatic inflammations, one of the most frequent is the introduction into the system of poisons, such as those of variola, rubeola, scarlatina, &c. The patches of erysipelatous and gangrenous inflammation which appear in different and remote parts of the body after poisoned wounds, are merely symptomatic of the typhoid and malignant fever which is the primary and more immediate effect of the poison. The various cutaneous affections attending the febrile exanthemata are merely symptoms of a general disease, and do not constitute its essential features, as they are often very slight and sometimes even altogether wanting; the latter case constitutes a variety of disease described by nosologists as *variola sine variolis*, *morbilli sine morbillis*. The buboes of the plague afford another instance of symptomatic inflammation, and the various swellings and critical abscesses subsequent to continued fevers are of the same description. The paroxysms of some intermittent fevers have been attended with regular attacks of ophthalmia, diarrhoea, or dysentery. Erysipelas and anthrax are in numerous instances to be traced to a state of general repletion, combined with a vitiated condition of the blood and of all the secretions, and are accompanied by typhoid fever.

Symptomatic inflammation is of frequent occurrence also after the healing of large and long-established ulcers; after the removal of a limb, in a state of profuse suppuration in consequence of compound fracture; and particularly in cases of phlebitis, which are so often attended with the formation of abscesses in parts remote from the original inflammation. Symptomatic inflammation is

attributed in general either to nervous sympathy or to a vitiated state of the blood. The absorption of pus and its combination with the blood is considered by some pathologists as the principal cause of the secondary inflammation and suppuration. It has been ascertained beyond doubt that pus is sometimes absorbed both by the veins and lymphatics, and circulated with the blood; it may be either the produce of the inflammation of the vessels themselves, as in cases of phlebitis, or be taken up by them from inflamed and suppurating parts. Pus has been found in the veins and lymphatics in the neighbourhood of diseased joints, of unhealthy stumps, of old ulcers, and of inflamed organs, such as the uterus, intestines, liver, and brain. Collections of matter have also been found, however, in these cases, in parts of the body remote from the inflamed organ; as, for instance, in the lungs, spleen, joints, serous cavities, and even in some of the muscles; and this has occasionally taken place without the least trace of any concomitant inflammation being discovered in these parts. M. Dance states, in his work on this interesting subject, that he has observed pus in the veins of the arm, on bleeding women affected with uterine inflammation and phlegmasia dolens. We have seen purulent deposits in several parts of the spleen of a man who died of fever soon after the healing of a large chronic abscess between the muscles of the thigh; the texture of the spleen was in every other respect perfectly healthy. Small collections of pus have been observed by Andral and Velpeau in the centre of the coagula of blood found in the heart and large vessels.* It appears reasonable to conceive that the mixture of pus with the blood should become a source of irritation, as well as any other heterogeneous principle, and this may, therefore, be admitted as an occasional cause of symptomatic inflammation; it can scarcely, however, be considered as the only cause, since we have seen that these accumulations of pus sometimes take place as the effect of an ordinary process of secretion, and without any accompanying inflammation.

The absorption of pus was for a long time erroneously considered to be the primary cause of hectic fever. That this is a mistake is clearly proved by the fact that hectic fever is often induced by the long-continued irritation of vital organs, with very little or even the total absence of suppuration; while very extensive collections of matter may exist for a long time in parts of less importance without any hectic.

Symptomatic inflammation differs in most cases from spontaneous inflammation by following a fixed and regular course, and having always the same mode of termination, as is exemplified in the febrile exanthemata. Among the secondary inflammations may be included that of the pleura consequent upon the opening of a tubercle or abscess into its cavities, or that of the peritoneum from the perforation

* Andral, Pathol. Anat. transl. vol. i. p. 97.

of the intestines, bursting of an hepatic abscess, or rupture of the uterus.

The division of healthy inflammation adopted by Mr. Hunter was the adhesive, suppurative, and ulcerative. He observed that in the cellular membrane, and all circumscribed cavities, the adhesive inflammation takes place more readily; whilst in internal canals, and all cavities having a communication with the exterior, and which are lined with mucous membranes, the suppurative and ulcerative inflammation come on most readily, and the adhesive very seldom. Adhesions would in general prove hurtful in these membranes; and they only take place from very violent and long-continued inflammation.

Mr. James, in his work on inflammation, takes, as the basis of his division of inflammations, their disposition either to be limited by the effusion of organizable coagulable lymph, or to spread. This distinction appears founded in nature; for the common inflammation of the cellular membrane, and of parenchymatous and glandular organs, which is termed phlegmon, is generally circumscribed by the effusion of coagulable lymph; whilst in certain textures, such as the fibrous, inflammation shows a remarkable tendency to spread, assuming the character of erysipelas; and the same tendency seems also to be induced in all other parts of the body by a deficiency in the powers of the constitution; a certain degree of vital action being required for the production of coagulable lymph. The orders in Mr. James's division are established on the principle of the degree of connexion of the organ with the vital functions of the animal; and the genera are founded on the original disposition of inflammation to have particular modes of termination, as, for instance, in boil and whitlow to suppurate, in carbuncle to slough, and in mumps to resolve; and this disposition, he justly observes, is so strong as to render it extremely difficult to procure any other termination.

One of the most usual divisions of inflammations with reference to their nature has been into common and specific. Common or healthy inflammation is that which usually follows the action of mechanical or chemical causes, of which phlegmon may be taken as the general type.

Specific inflammation is distinguished by certain peculiarities in its symptoms and progress, which are to be attributed either to a special morbid diathesis or to the specific nature of the exciting cause. Thus inflammation of the urethra from a mechanical cause is common inflammation; the inflammation from gonorrhoea is a specific inflammation. The principal varieties of specific inflammation are the *scrofulous*, *syphilitic*, *rheumatic*, *gouty*, *erysipelalous*, the *gangrenous inflammation*, produced by morbid poisons, or else by constitutional causes; the *unhealthy inflammation* that characterizes cancer and all new growths of a malignant description.

Scrofulous and syphilitic inflammation affect a variety of tissues at the same time; the pe-

culiarities by which they are distinguished will be fully described in the articles *SCROFULA* and *SYPHILIS*.

Gouty, *rheumatic*, and *erysipelalous* inflammation will be described when treating of the modifications of inflammation by texture.

The peculiarities of the inflammation arising from animal poisons have been sufficiently detailed under the head *Constitutional Symptoms*; and those belonging to cancer and other new growths of a malignant nature will be considered in a separate article.

Latent inflammation.—It was observed, in the account of the constitutional symptoms of inflammation, that in some cases no inflammation exists, although many of its symptoms are present. It is a fact equally well established, that inflammation sometimes occurs, even to a considerable extent, without any indication of its existence from either local or general symptoms; or it very often happens that the more important are absent, and those which are recognized are insufficient to indicate the disease. Hoffmann was the first writer who noticed the latency of inflammation, and affirmed that he had found most intense abdominal inflammation without pain or sense of heat; and his observations were confirmed by subsequent writers. Baglivi states, "*Pleuritides frequenter sunt occultæ, quia indolentes, unde gravissimi errores in praxi succedunt.*"* Stoll has also given an interesting account of an epidemic fever, the chief character of which was a latent peripneumony; and in his *Ratio Medendi* a description is given of other forms of latent inflammations.†

Modern pathologists have confirmed the frequency of latent inflammatory diseases, the detection of which is now rendered more easy from the various improvements which have been recently made in diagnosis, more especially in the physical signs of diseases.

It is very difficult to account for the occurrence of inflammation without its characteristic signs; for not only is this latency observed in structures in which the sensibility is dull, but in those in which, under inflammation, it is most exquisite, as in pleurisy and peritonitis. It has been remarked by many practical writers that the condition of the nervous system has a material influence in obscuring local inflammations: this is more especially the case in continued fevers, in which the various local inflammations are rendered latent in proportion to the degree of affection of the nervous system. This, however, is not the sole cause, for cases of latent inflammation constantly occur where the nervous system is comparatively little if at all affected; it is important, however, in fever with moderate or severe cerebral affection, that the state of the various organs should be carefully examined, in order to discover the existence of organic inflammation.

It is also well known that some tissues, such

* Prax. Med. lib. i.

† A good account of both latent and symptomatic inflammations is given in the article *Inflammation* in the *Dictionnaire de Médecine*.

as mucous membranes, may undergo inflammation, and even changes of structure consequent thereon, without pain or other local indication of disease, although the constitution sympathizes powerfully with the inflamed organ. We have an instance of this in the equivocal nature of the symptoms of inflammation of the mucous membrane of the intestines, and in the latent symptomatic bronchitis of fever. Again, the progress of chronic inflammation is sometimes so slow and gradual that both the organ affected and the constitution become accustomed to it by insensible degrees, and even accommodate themselves to the impediment of function the lesion induces. Even the brain, which is the organ from which sensibility is derived, affords an illustration of this pathological fact, as local or partial inflammation of this organ may exist, and be proceeding to disorganization of its structure without urgent symptoms. In such cases not only are the more prominent signs, such as pain in the head, sense of weight, or vertigo, absent, but the mental powers are often scarcely affected, or only to a very slight degree, and the attention of the patient and his physician is perhaps for the first time awakened to the danger of the disease by some sudden seizure which rapidly destroys life.

Latent inflammation of the lungs has been alluded to as of frequent occurrence in continued fever, and would be frequently entirely overlooked, were the practitioner to trust entirely to the absence of the ordinary symptoms. In these cases auscultation seldom fails to detect the existence, nature, and extent of the pulmonary disease, which is often the chief source of danger. It is a well-ascertained fact also that partial or circumscribed pneumonia, catarrh, or congestion of the lungs, may exist for a considerable time without any perceptible change in the general health. If these partial chronic affections of the pulmonary organs be neglected, they often lay the foundation of more extended and dangerous disease; in such cases the value of auscultation must be admitted by the most sceptical.

Equally uncertain are the symptoms of several intestinal lesions, gastro-enteritis, and hypertrophy, and ulceration of the mucous follicles; so fallacious indeed have the symptoms of these lesions proved, that pathologists despair of fixing on their peculiar pathognomonic signs.

Chronic inflammation and even suppuration of the glandular organs of secretion, the liver and kidneys, chronic diseases of the heart, pericardium, and large vessels, originating primarily in inflammation, are among the latent affections discovered only after death.

Latent inflammation of the lungs or liver sometimes succeeds to capital operations, such as lithotomy or amputation, and to severe injuries of the head. We have already alluded to the non-inflammatory purulent deposits observed in organs after severe surgical diseases or operations.

These facts, connected with the occurrence of latent inflammation, shew the necessity of careful investigation into the history of each

case in which there is the slightest suspicion of latent disease going on in any organ essential to life. In the absence of external or evident symptoms, physiological examination may often assist the practitioner in its detection, more especially in those organs which cannot be brought under ocular or manual inspection. For example, chronic diseases of the brain may often be discovered by imperfection in the performance of its several important functions. In pulmonary inflammation, the state of the respiration as to frequency and regularity, the nature and intensity of the sounds elicited by auscultation, and the character of the expectoration, afford important guides. In intestinal inflammation, inquiry as to the presence or absence of pain, the condition of the tongue, the frequency and character of the alvine evacuations, and the other modes of exploration of the abdomen, are never to be omitted.

It must, however, be admitted, that even with the most minute and careful investigation, latent inflammations elude observation, and tend much to impress on the reflecting mind the diffidence with which we should pronounce the existence or non-existence of organic lesions during life, unless they are accompanied with such manifest signs as to render their existence and nature perfectly unequivocal.

Varieties of inflammation according to texture.—While the study of the healthy structure of the separate textures of the body has materially contributed to the improvement of physiological science, the great attention paid of late years to the diseased structure of the different animal tissues has led perhaps more than any other circumstance to a similar rapid advance in our knowledge of pathology. The merit of having first pointed out the advantages that might be obtained from investigating the modifications induced in disease by the structure of the part affected, and of making the animal tissues the basis of a new nosological arrangement, is attributed on the continent to the celebrated Pinel. We have before observed, however, that the writings of William Hunter, Cullen, and John Hunter contain many allusions to the striking differences several tissues present in their diseased structure; and that Dr. Carmichael Smith published an admirable paper in 1788, in which this learned physician took a comprehensive view of the peculiarities of inflammation as they are observed in the different sorts of organic substance found in the animal body.

We proceed to give an account of the changes of structure induced by inflammation in the principal tissues, and acknowledge the valuable information we have received on this important subject from the excellent work of Gendrin. We have consulted also, with much advantage, the works of Laennec and of Andral, and the valuable *Elements of General and Pathological Anatomy* of Dr. Craige.

1. *Cellular tissue.*—The two most obvious properties of the cellular tissue in health are its expansibility and elasticity. When examined after the full development of active inflammation and before suppuration has taken place, it

is found inextensible, hard, and easily broken down; its areolæ are filled with a red homogeneous, opaque, gelatinous-like matter, with which it is so firmly incorporated that it cannot be removed by ablation. The density and infiltration decrease from the centre of the inflammation; the redness also gradually lessens in intensity, but the vessels are enlarged, very minutely injected, and distended with blood. Where the redness disappears, the tissue has preserved its elasticity, but is filled with a yellowish serous fluid forming a greater or less degree of œdema, according to the laxity of the tissue and depending position of the part. When the inflammation has been violent, there are found in the central portion, besides the sanguineous infiltration, small cavities filled with black extravasated blood mixed sometimes with serosity or broken down fatty and cellular substance, or a puriform fluid. When these cavities are numerous, or when large and attended with extensive disorganization, there is a great risk of mortification.

If the part affected contains much of the vesicular adipose tissue, it will be variously affected according to the degree of the inflammation; when moderate, the fat is mostly resorbed; but if intense, it is broken down, mixed with the blood, and converted into a yellowish and pultaceous matter. The preceding morbid alterations constitute what is termed by Gendrin the *red infiltration*. As the inflammation proceeds towards suppuration, the redness gradually decreases, and is only very slight after the secretion of pus has commenced. The cellular tissue then becomes softer and spongy; the sanguineous infiltration is succeeded by that of a yellow puriform fluid; and this constitutes the *yellow infiltration*.

When the suppuration is completed, the pus collects into one or several cavities; the walls of these cavities are lined by a condensed layer of red and vascular cellular substance; the swelling becomes more defined and circumscribed; the surrounding œdema diminishes and a common abscess is thus formed.

The variety of inflammation just described is that belonging to common *phlegmon*, and is always circumscribed; it may take place in any part of the body, but some are much more disposed to it than others; it often occurs, for instance, under the jaw, in the axillæ, near the rectum, or urethra, &c. Phlegmonous abscesses frequently appear after febrile diseases, particularly the exanthemata, and are generally considered critical.

There is another form of acute inflammation of the cellular membrane, differing chiefly from the preceding in not being circumscribed, but spreading by continuity without any regular limits, and which has received the name of *diffused inflammation*. This is a constant attendant of the erysipelas phlegmonodes, and is occasioned also by the inflammation of veins, by sprains and external violence, by the inflammation of deep-seated fibrous textures, and that of poisoned wounds. Although frequently combined with erysipelatous inflammation, it may exist without it, and generally terminates

in diffused suppuration of several portions of the inflamed cellular tissue, and sometimes in sloughing. The first account of diffused inflammation of the cellular membrane as a separate disease was given by Dr. Duncan.

In *chronic inflammation*, the cellular tissue loses its elasticity, and becomes condensed and thickened by the uniform infiltration of a coagulated, albumino-gelatinous fluid, which fills its areolæ. It is difficult to divide with the knife, and not so easily broken down as in acute inflammation; in some cases the infiltration is of a greyish white; in others it has a red marbled appearance. The inflammation may either be circumscribed and terminate abruptly, or become diffused and surrounded with œdema. That peculiar affection of infancy called the *skin-bound disease*, originates in chronic inflammation of the cellular membrane. The whole surface of the body is swelled and hard, and the skin is cold and tight-bound. A similar disease has been sometimes observed in the upper and lower extremities of adults, especially in young women of a phlegmatic temperament, and is extremely difficult to remove.

Chronic inflammation of the cellular membrane may end in suppuration or ulceration. It never supplies perfect pus, but rather a sero-purulent viscid yellowish fluid, sometimes slightly tinged with blood; it shews no tendency to cicatrization, forming rather cold abscesses, fistulous canals, and chronic ulcers. The walls of the abscess are sometimes permanently organized, so as to be converted into a cyst.

Gangrene may be the effect of the intensity of the cellular inflammation. There is also a form which tends to destroy the vitality of the part from its commencement. This is either the effect of morbid poisons, or of an irritable and depraved habit of body; it is of frequent occurrence after poisoned wounds, and in some varieties of erysipelas, and constitutes the formidable disease termed *hospital gangrene*. The inflamed tissue becomes flabby, of a livid or black colour, intolerably fetid; and it finally separates from the living parts in the form of eschars. The moment the part has become gangrenous, all circulation, both in the blood-vessels and absorbents, ceases, and the vessels are obliterated; the truth of this, which was always taken for granted, has been fully demonstrated by a number of experiments performed by Gendrin.

Serous membranes.—It is a well-established fact that a serous membrane and the organ it invests, may each be affected with inflammation separately, although in perhaps the majority of cases the inflammatory action extends more or less from the one to the other. The serous membranes are connected with the textures which they either line or invest by a cellular tissue of different degrees of density, and it is not always easy to ascertain the exact line of separation between the serous membrane and the subjacent cellular tissue, in consequence of the great similarity of their texture. This is an important consideration in

deciding upon the thickness of serous membranes; for where the sub-serous tissue is loose and abundant, a considerable portion of it may be raised with the membrane, and add apparently to its thickness. Gendrin has given the best explanation of the causes of thickening in serous membranes. Some pathologists have denied that they are ever really thickened; but this is a mistaken assertion, as is rendered particularly evident by the changes induced by chronic inflammation.

The sub-serous cellular tissue always participates in the inflammation of serous membranes, and traces of the inflammation are observed in this tissue, before the substance and free surface of the membrane are at all affected. The first changes induced by inflammation are a red injection and serous infiltration of the connecting cellular tissue, which loses its elasticity and is easily torn; sometimes globules of air have appeared, forming a slight degree of emphysema. When the inflammation has lasted some time, this serous infiltration penetrates between the laminae of the serous membrane, causes a real increase of thickness, and renders it opaque. These changes are greater where the membrane is connected to the adjacent part by an abundance of loose cellular tissue, as is the case with the portion of arachnoid covering the brain, than where this tissue is very close and firm, as in the portion of the arachnoid lining the dura mater. The degree of facility with which inflammation is propagated from serous membranes to the adjacent parts, and *vice versa*, depends also, in a great measure, on the density of the sub-serous cellular tissue, and on its penetrating more or less into the texture of the subjacent organs.

The inflammation of serous membranes exhibits, therefore, in the beginning, patches of a uniform bright-red, confined to their adherent surface, and to the subjacent cellular tissue, which is infiltrated with serum. As the disease advances, the free surface of the membrane becomes dotted with small red points, and overrun with minute red streaks; the vessels, which before conveyed only a colourless fluid, beginning to admit red blood. The red patches gradually spread and unite together, and the number of red dots increases, resembling very small petechiae; in some cases they are much larger and stellated, constituting patches of ecchymosis. The membrane in the intervals is white and opaque, and there is a sensible increase of its general thickness, arising from the infiltration of serum between its laminae.

Some serous membranes are but very slowly injected in inflammation, and sometimes even not at all, as for instance the arachnoid; but as soon as the subjacent cellular tissue becomes red and filled with serosity, the membrane loses its transparency, assumes a milky white appearance, and is increased in thickness.

In cases of simple congestion, all the vessels of the sub-serous cellular tissue are very minutely injected, and sometimes a few of the

vessels of the membrane itself; and the great vascular injection seen through the transparent membrane has occasionally been mistaken for inflammation. The redness, however, can easily be removed by pressure and ablation; there are no permanent red dots or patches of ecchymosis; the membrane is neither thickened nor opaque; there is either no sub-serous effusion, or, if any, it is very slight, and the fluid not coagulated. It is necessary to remark that, when the redness of inflammation is only slight and of recent date, it often disappears partially after death.

One of the effects of commencing inflammation in a serous membrane is an increase of secretion, and the effusion of a serous fluid, at first limpid, and of a citron or reddish colour. This fluid contains a small proportion of albumen, which increases when the inflammation is severe, and it bears a strong resemblance to the serum of the blood. When the inflammation is only moderate or partial, the fluid may be absorbed almost as fast as it is effused, so that there is little or no accumulation. The surface of the inflamed membrane has been sometimes found unusually dry, although highly inflamed. This has occurred in cases of arachnitis, pleurisy, and pericarditis, in which the inflammation was very intense and proved rapidly fatal.

As the inflammation increases, and particularly if intense, all secretion is suspended, or it consists only of a very small quantity of bloody serum or of pure blood, as is seen occasionally in the arachnoid, pleura, and peritoneum: the effusion of blood has been sometimes very copious in pleurisy and peritonitis, and described as hemorrhagic inflammation. It is the constant effect of violent inflammation to stop both exhalation and absorption. We have stated already, when treating of congestions, that large effusions, not purulent, are more frequently the produce of congestive irritation than of active inflammation. When the inflammation abates, if, instead of ending in resolution, it is disposed to pass into the chronic state, the effusion then increases considerably, and, losing its limpidity, consists of a mixture of pus and serum: the pus is yellow or greenish, and sinks to the bottom. It is important, therefore, to remember that the period of decline of the inflammation of serous membranes is always attended with the danger of increased effusion. There is sometimes exuded, chiefly on the surface of the arachnoid, a layer of thick green pure pus, without any serous fluid or plastic coagulable lymph, and adhering but slightly to the surface of the membrane: this has been also observed, though more rarely, in the peritoneum and pericardium. Pus is effused also in the sub-serous cellular tissue; and this is the most usual form of suppuration in the arachnoid, as pus is but seldom poured out from its free surface. In the other serous membranes, on the contrary, pus is more frequently exuded by their free than by their adhering surface. The greater looseness and vascularity of the sub-serous cellular tissue in the arachnoid may

account for this difference. The serous fluid effused beneath the arachnoid, and in the pia mater, has a gelatinous appearance, and consists of coagulated albumen, combined with various proportions of serum according to the intensity of the inflammation; in some cases, one part of the effusion having been absorbed, the remainder becomes circumscribed in cavities formed by false membranes.

The surface of an inflamed serous membrane soon becomes covered, wherever the inflammation extends, with a very thin layer of an apparently albumino-gelatinous substance; when this is removed, the membrane is found to have lost its smooth polish, and appears rough. This deposit gradually becomes thicker and more adherent, and forms the rudiment of a false membrane: it is almost always accompanied with a serous or sero-purulent effusion; but in some rare cases, the effusion has been wanting. This organizable matter has been found by the experiments of Dowler and Lassaigne to consist of two parts; one concrescible and adhesive, formed of fibrine; the other fluid, and contained in the cells of the former, consisting of albumen; it constitutes what is generally known as coagulable lymph, and by undergoing certain modifications is converted into pus. When adventitious membranes do not become organized, Laennec says they are generally softened down into pus. There is a greater disposition to the formation of false membranes in the serous than in any other tissue of the body. The coagulable lymph is variously disposed; when exuded in considerable quantity, portions of it are generally separated from the surface of the membrane, and float in the shape of flocculi in the sero-purulent effusion, giving it a turbid whitish appearance, especially in the abdomen; from which circumstance arose the old opinion, that the effusion of this fluid in puerperal women was owing to the metastasis of the milk.

The lymph is sometimes deposited in the shape of small globules studding the membrane; at others it forms papillæ symmetrically arranged, or assumes a granular or a reticulated appearance; this is generally the case in the pericardium. The organizable matter itself is porous and cellular, containing a fluid that may be expressed by pressure. The soft portions of coagulable lymph that adhere to the opposite surfaces of the serous membrane, following the movements of these surfaces in the cavities of the thorax and abdomen, are drawn out into filaments, lamellæ, or cords, which, becoming organized, constitute cellular adhesions; their organization takes place in the following manner: the false membrane gradually becomes denser and more adherent, in consequence of the absorption of its thinner portion, and at last exhibits traces of commencing organization by becoming injected with blood. How to account for the presence of the blood is an interesting subject of inquiry, which has excited much discussion: it must either be brought by the vessels of the serous membrane which shoot into it, or else be spon-

taneously formed in the organizable lymph. Gendrin relates some interesting microscopic observations in support of the former opinion, for which we must refer the reader to his valuable work, not having space to quote them.* Laennec, and some other pathologists, have adduced, however, facts that seem to prove beyond all doubt that coagulable lymph possesses an independent vital property, in virtue of which it becomes organized. Laennec has shewn that portions of exuded fibrine perform the functions of secretion, absorption, and nutrition, before the slightest trace of any vessels can be discovered in them; for in some cases of peritonitis and pleurisy he found that the exhalation and absorption of serous fluids took place to a considerable extent between the layers of coagulable lymph, before they were organized; and that one layer of lymph is moreover capable of secreting another, as proved by a case he published in the *Journal de Boyer* for the year 1801. The fluids, therefore, under the influence of some vital impulse, must make channels for themselves in all directions between the fibres and laminae of the lymph; this process is justly compared by Andral to the life of some zoophytes composed of an amorphous mass of gelatine, who absorb, digest, excrete, and are nourished, although they do not present any vestige of regular organization. Serous fluids and collections of well-formed pus and of calcareous matter have been found in the centre of masses of coagulated fibrine, by Andral, Velpeau, and several others, shewing that it was susceptible also of morbid irritation. The development of various new morbid growths may, no doubt, be accounted for on the same principle.

The first traces of organization in the coagulable lymph are the appearance of a few red dots, resembling small collections of blood, and analogous to the *punctum saliens* in the vitellary membrane of the chick, the fibrine being endowed with a similar property of secreting red blood. Sometimes there are red lines or furrows running in various directions and anastomosing, so as to form meshes and net-works; and at a later period we find distinct bloodvessels, through which the blood regularly circulates. The globules of the blood probably move about in various directions, tracing passages for themselves through the lymph, until regular vessels are thus formed; or else the small trains of coagulated blood become converted into vascular tubes. Laennec states, that on examining these trains of blood, he has found them to contain small white cylindrical filaments of fibrine, permeable in the centre and containing blood, and which he considers to be the rudiments of vessels. Some of the branches of this independent circulating system finally inosculate with the vessels of the adjoining tissues. The vessels formed in a clot of blood have been successfully injected by John Hunter and Sir E. Home, as may be seen in some beautiful

* *Histoire Anatomique des Inflammations*, vol. ii. p. 551.

preparations in the museum of the London College of Surgeons. It is in the inflammation of bloodvessels that the various transformations the fibrine undergoes can be the most accurately traced.

As soon as a regular circulation of blood has been established in the mass of coagulated lymph, it begins to lose its homogeneous nature, and may assume a laminous, cellular, mucous, or fibrous texture, analogous to the structure of the tissue by which it has been supplied; the nervous and muscular tissues form the only exception. In serous membranes the filaments and lamellæ of soft lymph, after being highly injected, gradually shrink into thin transparent laminæ, until their redness and vascularity entirely disappear, and they assume the exact appearance of a portion of cellular or serous tissue; these new textures are found to be provided with bloodvessels, lymphatics, and nerves; and this affords a striking proof of the independent vitality existing in each particle of living matter. The preceding is the mode of formation of all cellular adhesions. As soon as the false membrane begins to be organized, it may become the seat of inflammation, exude on its surface soft organizable lymph, similar to that from which it has derived its origin, and undergo various transformations exactly in the same manner as any other tissue. It is evident, from what has been just stated, that the two opinions respecting the formation of false membranes may both be admitted; that there are first currents of blood traversing the coagulated lymph without vessels; that there are vessels formed independent of any communication with adjoining parts; and that some of these vessels finally anastomose with the vessels of the surrounding parts, so as to connect the circulation of the new tissue with that of the system. The period at which false membranes become vascular varies; numerous vessels have been seen on their surface twelve hours after their formation, and in other cases they have remained several months without presenting any trace of organization.

The alterations of structure produced by *chronic* inflammation in serous membranes differ from those of acute inflammation rather in degree than in kind; the transition, indeed, from the one stage of inflammation to the other is in general very gradual, and there are often intermediate and mixed cases, which it would be difficult to refer exclusively to either.

The redness is generally less, and inclines to a dark brown; the principal difference consists in the increase of thickness and density of the membrane; the sub-serous cellular tissue, which is completely filled with albuminous fluid, has become so identified with the membrane on the one side, and portions of false membrane are often so firmly connected with its free surface, that when the membrane is raised, its thickness and density appear considerably augmented. We have preserved portions of arachnoid membrane, which had been long exposed to chronic inflammation, fully as thick as common parchment. There are some-

times patches of a pearly white, perfectly opaque, and of a greater thickness and firmness than the rest of the membrane.

One of the alterations peculiar to the chronic inflammation of serous membranes is a rough granulated appearance of their surface, well described by Gendrin; these granulations are but slightly raised, white, irregularly dispersed, imbedded in the substance of the membrane, and are sometimes intermixed with a number of brown dots; the granulated bodies are firm, and never soften down or suppurate. The surface of serous membranes is sometimes also studded with masses of tubercular matter, which may acquire a considerable size; these tubercles are developed either in the substance or on the surface of the membrane, but generally in connection with adventitious membranes, and sometimes become softened. Tubercles are much more common in peritonitis than in pleurisy.

The effused fluid is mostly of a yellowish or milky white, and has a peculiar and sometimes fetid smell; it may contain portions of a flaky albuminous substance, mixed with pus, or be altogether puriform, or, as in the majority of cases, consist of a clear serum. It has been sometimes found entirely gelatinous, resembling a solution of isinglass. The quantity of effusion is usually so considerable as to distend the cavity in which it is contained, and compress the adjoining organs, as is seen in empyema and chronic peritonitis.

There are generally found false membranes, always completely organized, and in some cases very thick, and of a firm, fibrous, cartilaginous, or even osseous texture; these adventitious membranes are sometimes disposed in layers of different textures and degrees of density; they give the serous membrane an appearance of great thickening, which has not unfrequently been a source of deception; but on closer inspection the membrane will be found, beneath the adventitious tissues, not very materially altered. In some cases numerous adhesions are found, with an infiltration of pus between them; and when this occurs in the thorax, its cavity may become contracted, especially if, as occasionally happens, the pus makes its way by a fistulous opening to the surface. The cavity lined by the serous membrane may also be completely obliterated by a mass of adventitious tissue of a dense, indurated, fibrous nature, or else spongy, cellular, and filled with an albumino-gelatinous matter: this adventitious tissue is sometimes separated from the serous membrane by a thin stratum of soft lymph, especially when death has been occasioned by an attack of acute inflammation.

These firm and completely organized adventitious textures always indicate the pre-existence of acute inflammation. When an acute attack has supervened on chronic inflammation, the false membranes are found, as well as the serous membrane, of a vivid red, and covered with newly effused coagulable lymph or fresh pus, which are the products of the recent-inflammatory action; Gendrin states that it is sometimes possible to ascertain when there

has been more than one attack of acute inflammation, by the different degrees of organization of the newly-formed tissues. The fatal termination of chronic inflammation is to be attributed in the great majority of cases to the superposition of acute inflammation.

The serous membrane is sometimes found perfectly black, in consequence of the extravasation and infiltration of blood; this is the effect of an hemorrhagic congestion occurring in the course of chronic inflammation; besides the large spots of ecchymosis on the surface of the membrane, there is generally an effusion of blood into its cavity, which is mixed with the pus or serous fluid it already contained: these appearances could scarcely be mistaken for gangrene. Hemorrhage is not an unfrequent accompaniment of pleurisy, both acute and chronic: it is supposed to be occasionally the result of the rupture of some of the delicate vessels of the false membranes; the effusion is in general considerable, and causes the inflammation to become chronic. Laennec conceives that this mixture of blood and coagulable lymph favours the formation of fibrous and cartilaginous adventitious tissues, and states that he has observed in such cases a layer of dense membrane lining the costal and pulmonic pleura, and united by a third layer of a soft, gelatinous, semi-transparent substance.

Chronic inflammation has sometimes subsided leaving the effusion behind it. This is rather a rare occurrence, as the effusion generally disappears with the inflammation. There are, however, some instances of ascites and hydrothorax subsequent to peritonitis and pleurisy, and other cases, perhaps more numerous, of hydrocephalus succeeding chronic arachnitis in children. When the effusion has remained a considerable time, all traces of inflammation in the solids may have been removed. It should, however, be kept in mind that simple effusions are more generally the effect of active congestion than of acute inflammation. Chronic inflammation of serous membranes is often attended with swelling, induration, and suppuration of the neighbouring lymphatic ganglions.

There are no cases on record of the specific *gangrenous* inflammation of serous membranes. When affected with gangrene, it is always the consequence either of the violence of the inflammation of the membrane itself, or of the gangrene of adjacent tissues, such as, for instance, the bursting into the cavity of the pleura of a gangrenous abscess of the lung, and does not, therefore, require any separate description. The same may be said with respect to ulceration.

The skin.—The two organic textures of the skin, the dermis and rete vasculosum, may be separately affected with inflammation. The rete vasculosum (or corpus mucosum) is sometimes the chief seat of the inflammation, as is exemplified in erysipelas, the exanthemata or eruptive fevers, and the scaly, vesicular, and papular cutaneous eruptions. This will be described under the generic name of *erythemoid*

or *diffuse inflammation*. The rete vasculosum and external surface of the dermis may be jointly inflamed, and an eruption of pustules or tubercles, often followed by ulceration, take place, as in variola, vaccinia, and other pustular and tubercular cutaneous diseases. This will constitute the division of *pustular inflammation*. Or the substance of the dermis itself may be the chief seat of the inflammation, which often extends in this case to the subcutaneous cellular tissue, of which furunculus, anthrax, &c. are examples. This will form a third division into *inflammation of the dermis*. We have followed in this respect the classification of Gendrin.

The inflammation, however, in each of these divisions is by no means always limited to the one texture, but, if very acute or of long duration, extends to the others, as might naturally be expected, considering the intimate connexion existing between the different parts of the skin. Cutaneous affections often undergo in this manner great modifications in their appearances, one form of disease assuming in succession the characters of several others, or there being mixed cases; this will account for the great difficulty often experienced in assigning with accuracy every case to its proper class in the nosological arrangements of cutaneous affections.

Acute erythemoid inflammation comprehends the inflammation arising from blisters, burns, erysipelas, scarlatina, rubeola, &c.; it is almost always more or less diffused, and characterized in its commencement by a bright uniform fiery redness of the surface of the skin, called *rube-faction*; the exhalation being suspended, there is a dry burning heat, and also a very slight degree of tumefaction, perceptible only to the touch. If the inflammation increase, the epidermis becomes detached and raised, either in large bullæ and phlyctenæ, or small vesicles, by the effusion of a limpid yellowish serosity. When the epidermis is removed, the inflamed surface appears of a rosy tint slightly yellow; it is covered with red streaks, is rather tense, and exquisitely painful; small drops of limpid serum are constantly exuding. If the inflammation subsides at this period, the redness, pain, and serous secretion diminish, and the surface becomes covered with a pellicle of soft plastic lymph, which is gradually converted into a new cuticle. When the inflammation has been violent and the epidermis detached, a thick layer of a white concrete viscid lymph is sometimes found under it, as is seen in burns and blisters.

When the inflammation ends in resolution without phlyctenæ or vesicles, the epidermis often falls off in small furfuraceous scales, under which a layer of new epidermis of a shining bright or violet red has been formed, and which does not assume its natural colour until after some time, as is exemplified in rubeola and scarlatina.

If the inflammation, however, is intense and prolonged, there is poured out a reddish serum, which gradually becomes turbid, sero-purulent, and at last completely purulent. When sup-

puration is fully established, the inflamed surface is of a bright red, has a rugous or villous appearance, and portions of lymph are sometimes exuded along with the pus. As the inflammation and suppuration diminish, the small granulations, which resemble those of common wounds, gradually become lined with a thin pellicle constituting the new epidermis.

Intense inflammation of the rete vasculosum extends frequently to the dermis and subjacent cellular tissue, as is seen in the erysipelas phlegmonodes and in severe burns; the skin is then tumefied and tense, and its redness does not disappear on pressure. The dermis and subjacent cellular tissue are injected with a red gelatinous fluid, and there are sometimes spots of ecchymosis or of extravasated blood on the surface. The inter-areolar adipose substance is absorbed; the texture of the dermis has lost its elasticity, is easily lacerated, and appears as if carnified. There is sometimes extensive suppuration and sloughing of the cellular tissue. These are the various appearances presented by the skin in erythemoid inflammation, from the slightest to the most intense erysipelas.

If the skin has been slightly inflamed just before death, every trace of inflammation disappears in a few hours after death. At a later period, however, Gendrin states that the portion of skin which was inflamed is found in a state of passive congestion, and the epidermis becomes sooner detached by putrefaction than in other places. But when the cutaneous inflammation has been at all severe, the rete vasculosum always continues much injected after death, and there is sometimes also a certain degree of sub-cutaneous œdema. A few days after death the injection and œdema are considerably increased by cadaveric congestion, which might lead to the belief that the inflammation had been much greater than it really was; this arises from acute inflammation increasing the tendency of the solids to putrefy by lessening their force of cohesion.

The inflammation which gives origin to pustules (*pustular inflammation*) is of a phlegmonous character, each pustule bearing a considerable resemblance to a small phlegmon. They make their appearance first by small red dots, which increase gradually to round spots of a bright red, a little raised in the centre, giving a feeling of roughness or rugosity to the skin; the swelling of these spots goes on increasing until they form small, round, firm, red tumours, imbedded more or less deeply in the dermis, each tumour being surrounded by a red areola. The progress in the development of these pustules is very variable, being in some diseases fixed and regular. They differ also in their form, structure, and mode of termination. Some, as variola, are flattened, have several cells, and are depressed in the centre, the depressed part being attached to the dermis by one or several small white fibrous connections.

An eruption of acute pustules is also occasioned by the application of a variety of irri-

tating substances, and particularly of tartar-emetic ointment and mercurial plasters; they are small, depressed in the centre, and have only one cell containing a little pus. Pustules may be either disposed in groups or irregularly scattered over the body; some varieties are acuminate instead of being depressed at their apex. Pustular diseases of a chronic character will be considered under the head of *chronic pustular inflammation*.

Inflammation of the dermis, *corion*, or *cutis vera*, includes chiefly two varieties of disease—*furunculus* and *anthrax*: the dermis is undoubtedly the principal seat of the inflammation in these affections, although it extends in general more or less to the subjacent cellular tissue.

Furuncle commences with a pimple in the skin, which gradually increases until it forms a small tumour of a conical shape, with a pustule on its apex, and generally very hard; it is of a bright or dark red, accompanied with burning heat, and excessively painful. The vascular and cellular processes that fill the areolæ of the dermis appear to be the primary seats of this inflammation, which afterwards spreads to the surrounding parts; it terminates in suppuration, and in the expulsion of a small body called *core*, after which the little abscess heals in the usual manner.

Cores have generally been considered as portions of cellular tissue which have mortified, in consequence either of the violence or unhealthy character of the inflammation; and this appears the more probable that a fetid and unhealthy pus is discharged from the abscess with them. Gendrin, however, is of opinion that cores are not sloughs, but a morbid secretion or pseudo-membrane, the product of the inflammation of the inter-areolar cellular processes. As they become enlarged, they distend the fibrous sides of the areolæ, creating great tension and a certain degree of strangulation; they act as foreign bodies, in exciting considerable inflammation in the sides of the areolæ; these are at first in a state of red infiltration, and adhere firmly to the cores; but as suppuration advances, the latter are gradually loosened and finally expelled. Gendrin states that cores consist of a viscid semi-transparent homogeneous yellowish white substance, and that he has never been able to discover in them any vessels or the least appearance of organization. The opinion of so accurate a pathologist is entitled to considerable weight, and should not be rejected without further careful investigation of the subject.

There is considerable analogy between the anatomical characters of *anthrax* and *furuncle*; the former is, however, a much more extensive and severe disease; it occurs generally at a more advanced age, is connected with a vitiated state of the constitution, and sometimes with the existence of a morbid poison in the system, as, for example, in pestilential fevers. Gendrin considers anthrax to differ only from furunculus in the circumstance of a number of the areolæ of the skin being affected with inflammation instead of one, and he states that he has seen the portion of af-

fect skin pierced in this manner with a great many holes. There is evidently, however, mortification of several portions of skin and cellular tissue, besides a new inflammatory deposit.

Anthrax commences, like furuncles, with a small pimple, which extends rapidly both in breadth and depth until it forms a large flat tumour, only a little raised above the surface of the skin, and extending under it into the cellular tissue; it is nearly immovable, very hard and painful, of an intensely burning heat, and of a deep but rather dark red; it feels like brawn, is distinctly circumscribed, and its surface is covered with livid pustules or vesicles; as the disease advances, the skin mortifies in the centre and ulcerates at the circumference; a fetid unhealthy pus is discharged, and after a considerable time and much suffering a large slough is separated, consisting apparently of the union of several sores, and completely sodden with pus. When the slough is removed, there remains a large ulcer, which heals by a slow suppurative process.

There are three varieties of anthrax: one benign and mild; another malignant, having a greater disposition to mortification, of which the anthrax of the plague is a good instance; and one variety of a chronic character, similar to chronic furunculus. The lymphatic glands in scrofulous subjects sometimes undergo a sloughing inflammation called glandular anthrax.

We have examples of *chronic erythemoid inflammation* in chronic erysipelas, old blisters, and many of the scaly, papular, and vesicular cutaneous diseases, such as lepra, psoriasis, ichthyosis, lichen, prurigo, pemphigus, rupia, herpes, scabies, miliaria, and eczema. In those cases in which the epidermis is not raised into vesicles or bullæ, the surface of the skin is injected, of a dark red colour, not removed by pressure, dry, hard, rather thickened, and covered with a number of small red elevations like enlarged papillæ, which give it a rugous appearance; the epidermis falls off in scales which are frequently renewed, or it forms scabs, from under which there sometimes oozes a viscid puriform fluid having a disagreeable smell. When these scales drop or are removed, they are generally succeeded by others.

The epidermis is raised in other cases into vesicles, phlyctenæ, or bullæ, containing a yellowish serum. The fluid of the vesicles may be resorbed, so that the detached epidermis forms a thin scale which falls off, as soon as a new epidermis has been formed; or the fluid concretes into a scab, which is also removed after the formation of a new epidermis. There is frequently a succession of new vesicles and scabs on the same part. The denuded skin under the phlyctenæ and vesicles is injected, red, and sometimes supplies a series of scabs without healing. When blisters have been long kept open, or when the chronic inflammation has been severe, as in psoriasis inveterata, the texture of the dermis is much altered; it is thickened and injected with a gelatinous fluid of a yellow red, has lost its elasticity and density, being easily torn, and

entirely deprived of adipose substance; the subjacent cellular tissue is also more or less thickened and œdematous. When the surface has been long denuded and suppurating, it is covered with soft, flabby, bleeding granulations of a yellowish red colour, and sometimes with layers of whitish concrete lymph, which is removed with the dressings. In ichthyosis the epidermis is enormously thickened, and acquires the hardness of horn; and in the common elephantiasis the dermis and subjacent cellular tissue are sometimes converted by the infiltration of an albumino-gelatinous matter into a new texture, thick, dense, homogeneous, and very like brawn.

Chronic pustular inflammation includes the various forms of impetigo, porrigo, ecthyma, acne, and mentagra, to which we may add the different kinds of tubercles into which the pustules frequently degenerate.

The pustules of these chronic cutaneous affections differ in their form, size, and situation; they are either large, acuminate, and with a hard and inflamed base, resembling in some cases small furunculi, as in ecthyma, impetigo, and acne; or they are small, round, granulated, and covered with thick scabs, as in porrigo; they may be dispersed over every region of the body, as in ecthyma and the impetigo sparsa, or be confined more particularly to certain parts, as in impetigo figurata, acne, and porrigo. Their first appearance is usually indicated by minute, red, itching, spots, which are soon raised into small round tumours; they are at first hard, either red, or of the colour of the skin, imbedded in the rete vasculosum and generally also in the dermis; the rete vasculosum around them is deeply injected, and of a yellow red, and the injection extends in severe cases to the entire thickness of the dermis, and even to the subjacent cellular tissue.

The pustules quickly suppurate and then contain an opaque and viscid fluid, or thick pus of a peculiar and disagreeable smell, similar in porrigo to that arising from mice. The suppuration is followed by desiccation and the formation of scabs; these are either thick, prominent, conical, and of a green or brown colour, as in impetigo figurata; or yellow, concave, and cupped, as in the porrigo favosa; or disposed in flat, irregular, lamellated masses, as in porrigo larvalis and lupinosa. When the part is thickly studded with small pustules, as in porrigo, the whole of the intervening skin is inflamed, tumefied, red, and exoriated, secreting a thick purulent matter, which, uniting with the crusts of the pustules, forms large masses of thick scabs; there are often intermediate fissures in the scabs, through which matter is constantly discharged. The inflammation is attended also sometimes with abscesses of the scalp. The sebaceous follicles are considered by some to be the principal seat of the inflammation in acne and mentagra, and the bulbs of the hair, in porrigo. Syphilitic pustules are characterized chiefly by their copper violet colour and great disposition to ulcerate; they are also sometimes depressed in the centre or flat, especially in children. A de-

tailed account of pustular affections of the skin will be found in the separate articles on cutaneous diseases.

Tubercles are larger and less inflamed on their first appearance than pustules. Some never suppurate, remain indurated and have but little vascularity, such as the verrucæ and moluscæ. Others, after acquiring a certain size, become inflamed, suppurate, are covered with thick scabs, and finally degenerate into unhealthy ulcers, which is the course of syphilitic tubercles. There are also a variety of fleshy excrescences and vegetations of the skin which may be considered as modifications of tubercular inflammation; they occur frequently after syphilis, and sometimes in scrofulous subjects; but occasionally also as a mere local affection.

Phagedenic inflammation of the skin is of a peculiarly malignant character; it leads to the formation of unhealthy ulcers, which spread more or less rapidly, destroying, by a process of suppurating and sloughing, the parts which they invade. It may affect almost every tissue of the body, but the skin is more subject to it than any other; it may supervene on other forms of inflammation, and sores of every description may assume a phagedenic character; this is more particularly the case with syphilitic and scrofulous ulcers, in which acute phagedenic inflammation is not unfrequently excited by the irritation of mercury. Phagedenic inflammation is sometimes idiopathic, especially in constitutions which have inherited either a scrofulous or syphilitic taint, or both.

There are two varieties of phagedenic ulcers, the *acute* and the *chronic*. In the *acute* the edges are swelled, inverted, jagged, and intensely red. The surface of the ulcer is of a fiery red, and discharges blood, accompanied with burning heat and extreme pain; it secretes a thin, sanious, acrid fluid. The acute phagedenic ulcer often spreads very rapidly, destroying the parts in some measure by a sloughing process. This form of phagedenic inflammation frequently occurs in scrofulous and syphilitic ulcers.

The *chronic* phagedenic inflammation of the skin commences generally by the development of small pustules, which soon degenerate into tubercles, the summities of which ulcerate; the edges of the ulcers are raised, indurated, of a violet red colour, less painful, and more circumscribed than in acute phagedena; the texture of the skin and subjacent cellular tissue is converted into a hard homogeneous substance resembling brawn; the bottom of the ulcer is of a dirty white, and covered with flabby granulations; the discharge is seropurulent, fetid, and sometimes sanious. The secretion frequently concretes, forming thick hard scabs, under which the ulcer continues to extend; this form of phagedena spreads more slowly, but destroys with the same certainty as the acute; it enlarges chiefly at the circumference, while syphilitic ulcers have a greater tendency to extend in depth; it sometimes heals in the centre while spreading at the edges,

and large soft vegetations arise occasionally from its surface; it varies in activity, being at one time indolent and at another more inflamed; the surrounding skin is often of a violet red, studded with hard tubercles or pustules of impetigo, and greatly predisposed to be affected with erysipelatous inflammation. After healing, these ulcers leave thick, red, and deeply furrowed cicatrices similar to those of burns.

The preceding form of phagedenic inflammation is principally observed in the formidable disease called lupus, and in the elephantiasis Græcorum.* There is a variety of phagedenic ulcer of the skin more superficial than the preceding, appearing in the form of tortuous lines or furrows, and called sometimes herpes serpens or exudens.

The skin is extremely liable to be affected with *cancerous* inflammation, cancer frequently having its origin in the skin, and spreading afterwards to the subjacent tissues; it commences by small pimples or pustules, which, after remaining for a greater or less interval of time hard and indolent, assume the form of tubercles, become more inflamed, are affected with lancinating pains, and finally ulcerate; the ulcers are deep, have hard, jagged, indurated, inverted edges, with a pale red, sanious, soft, and fungous surface; they gradually extend in depth and circumference; the surrounding tissues are converted into a new homogenous substance, intersected with white fibrous or fibro-cartilaginous bands, and presenting often small cells containing a sanguineous or cerebriform softened matter. Cancer of the skin occurs most frequently on the nose, lips, cheeks, prepuce, scrotum, and at the margin of the anus. We must refer the reader for a more detailed account of the various forms of cancer to the article SCIRRHUS.

The skin is more subject to idiopathic *gangrenous* inflammation than any other part, because it is most exposed to the direct action of deleterious agents, and it is also the principal seat of critical and symptomatic inflammations.

One of the frequent causes of gangrenous inflammation of the skin is poisoned wounds. The first effect that follows the introduction of any venomous matter into the skin, is the appearance of a small vesicle, attended with much itching; the skin under the vesicle is hard, and of a livid red around it; the hard tubercle in the centre, which is mostly insensible, soon assumes a black colour; the red areola spreads, the skin becomes tumefied, more livid, and covered with small phlyctenæ; the black gangrenous eschar extends rapidly from the centre to the circumference; the swelling of the skin and cellular tissue increases with considerable œdema and sometimes emphysema; the gangrene extends also in depth to the subjacent cellular tissue, and reaches frequently the

* An interesting account of two cases of the true elephantiasis that occurred in this country is given in the Medico-Chirurgical Transactions for 1815, by Mr. Lawrence and Dr. Southey.

tendons and bones, causing extensive sloughing. The constitution soon begins to suffer, and gangrenous erysipelas appears in several other parts of the body. We have already seen, however, when describing the constitutional symptoms, that the patient sometimes sinks from the destructive influence of the poison on the system, without any local affection.

In some very unhealthy constitutions, erysipelas occasionally assumes a gangrenous character from its first appearance; the inflammation is deficient in activity, and attended with considerable œdema; the skin is of a livid or dark red, covered with a number of phlyctenæ, beneath which are observed black livid spots; the portions of skin thus affected soon mortify, and the gangrene spreads with rapidity, creating large sloughs both of the skin and cellular tissue. In some cases small ulcers appear on the surface, or collections of matter are formed in the cellular tissue, destructive supuration being thus added to the gangrene.

The skin may also be affected with gangrene in consequence of the intensity of the inflammation, or from the direct action of irritants, such as intense heat, chemical agents, &c.: or finally from the benumbing effects of excessive cold.

(A. C.)

Inflammation of mucous membranes.—Previous to entering upon the description of the inflammatory affection of mucous membranes, we think it necessary to describe the healthy structure of these tissues.

In the greatest part of its extent, mucous membrane consists of a spongy tissue, more or less soft, and varying very much in thickness: this is the mucous corion, on the surface of which the ultimate vascular ramifications are found. An epidermis or epithelium is very distinctly seen on this corion in some situations, that is, at the orifices of mucous cavities. It diminishes in thickness as we trace it from the origin of the mucous membranes, till in the more internal parts it eludes our observation; in fact the existence of the epithelium in the internal mucous membranes cannot be demonstrated.

Mucous membrane is especially remarkable for a series of mucous crypts or follicles, which are uniformly to be met with, varying, however, in number and arrangement in the different situations. An examination of the foramen cœcum at the base of the tongue and of the tonsillitic follicles will clearly expose their structure. In the gastro-intestinal mucous membranes they are found in great numbers, and under two different modes of arrangement: in the one case they are isolated and distinct from each other, (*glandulæ solitariae*), under which form they are chiefly met with in the large intestine; in the other they are deposited in clusters, (*glandulæ aggregatæ*), and are to be seen chiefly in the small intestine, in the duodenum, and the colic extremity of the ileum.

Two varieties of eminences are found upon the free surfaces of mucous membranes; of these the most voluminous are called *papillæ*, of which

the best-marked examples are on the tongue, glans penis, and clitoris. In parts provided with papillæ, the mucous membrane is furnished with a distinct epithelium.

The second class of eminences are the *villi* or *villosities*, which are found most prominently on the gastro-intestinal membrane. They are highly vascular, and the recent observations of Leuret, Lassaigne, and others, leave no doubt that in them the capillary extremities of the lacteals commence. They appear, therefore, from this fact, as well as from other considerations, to be materially connected with the absorbing function. The pathologist should bear in mind that these minute bodies may be injected with equal facility either from the arteries or mesenteric veins, which latter, being destitute of valves, permit the injected fluid to pass in a retrograde direction.

The healthy colour of those portions of the mucous system which are near to the orifices, is so obvious to the most superficial observer as to render any remarks upon it unnecessary. The natural colour of the more deep-seated portion varies in infancy, adolescence, and old age. At the former, it is transparent or of a rosy white colour; at the latter age, it is of a dull white, but retains a slight rosy hue; in old age, it becomes ash-coloured. The process of digestion increases the rosy colour of the membrane, and sometimes, especially with young subjects, induces a cherry red-colour, obviously by increasing the flow of blood to it. Gendrin has found that fasting for any length of time also has the effect of heightening the colour of the membrane, which may be removed by nourishing the animal.

That the kind of death, moreover, has considerable influence upon the colour of the membrane is obvious, as in cases of death from chronic disease, from anæmia, and from asphyxia. Lastly, Gendrin found the mucous membrane increased in colour during the traumatic fever succeeding to a severe wound inflicted on an animal.

1. *Acute erythemoid or diffuse inflammation.* A change of colour is the most prominent mark of inflamed mucous membrane, occasioned by an increased vascular injection of those portions of the membrane to which irritation has been applied. This change of colour varies in extent and intensity, the membrane exhibiting either slight and superficial arborescent networks of an arterial red colour, or uniform spots, either red, brown, or black, and occupying the whole substance of the membrane.

The many varieties of vascular injection which mucous membrane in general, but that of the alimentary canal especially, presents, render it a matter of moment to determine, with as much precision as possible, those signs which characterize the vascularity of inflammation. Pressure diminishes the natural redness, or that of congestion, but does not produce that effect on the colour of an inflamed part. If the inflammation have existed for even a short time, maceration does not cause the redness totally to disappear, and those who are in the habit of making morbid preparations know how well

the inflamed membrane exhibits its vascularity when dried and varnished, as if the inflammation had excited a greater degree of cohesion between the blood and the coats of its containing vessels.

In the highest degree of inflammatory action, we not unfrequently find spots of extravasation, the submucous tissue being injected with blood, which either has escaped from the rupture of a minute capillary, or transuded through the parietes of the vessels. In those membranes which present numerous villi on their surfaces, inflammation begins by red points or dots, which appear to occupy the extremities of the villi, giving them a tumid erectile appearance. This condition of the membrane may be clearly demonstrated by examining it under water, or with the aid of a lens, or even by viewing its surface in an oblique direction. As the inflammation advances, the number of points increase, appear to coalesce, and give an aspect of diffused redness to the surface of the membrane. When the colour of the mucous tissue is naturally red, the increased color is uniform, nor is there an obvious appearance of arborescent or capilliform injection.

The surface of inflamed mucous membrane loses much of its natural softness; it is rugous, and if it be covered with papillæ, these bodies are rendered more prominent and swollen than natural; if with villi, a similar effect is produced; if crypts abound on the surface, the orifices of these secretory organs are less apparent, from the swollen condition of their margins.

Increase of the thickness of the membrane is a constant attendant on inflammation, as is well seen in coryza and laryngeal inflammation; it is in general immediately consequent on the redness, and in proportion to the degree of vascularity. At an early period of the attack, the density of the membrane appears to be also increased, but as the inflammation advances, the membrane becomes softened. The condition of the submucous tissue is deserving of attention; it is frequently infiltrated with a serous, or occasionally a bloody fluid, by which the thickness of the membrane is increased: this is more conspicuous when there are folds, such as the *valvulæ conniventes*.

A particular affection to which some mucous membranes are more especially liable may be here alluded to; it is, as Gendrin has well observed, intermediate between inflammation and oedema, and is distinguished by the term *œdematous*, on account of its principal characteristic being extreme infiltration of the substance of the mucous membrane, as well as of its submucous tissue, with serum. Of this, œdema of the glottis, and the œdematous condition so often seen in the velum and uvula, present familiar examples. The adhesion of the mucous membrane to the surfaces which they line is diminished considerably by inflammation, so that they are detached from them with facility—a facility, however, which varies according to the natural thickness of the membrane, and the structure of the connecting cellular tissue.

At the first invasion of the inflammation, the secretion of the membrane is somewhat increased in quantity and less viscid than natural; when the inflammation is at its height, the secretion is almost suppressed, and the membrane consequently dry; but as this period is always of short duration, the secretion is soon re-established, and often discharged in considerable quantity, assuming at times a greenish colour, and being occasionally tinged with blood. The orifices of the follicles are generally enlarged and open. Towards its decline, the secretion sometimes assumes a puriform character, and is in general very copious; this has been long known in the schools as exemplifying purulent secretion without solution of continuity.

Acute inflammation of mucous membrane sometimes terminates rapidly in gangrene, giving rise to the formation of large sloughs, which, when thrown off, leave a considerable solution of continuity. Such is the case in certain inflammations of the throat, (*cynanche maligna*), and in some severe forms of dysentery; in which disease the mucous coat of the large intestine often presents several patches of this kind.

The action of some acrid poisons excites in mucous membrane a high degree of inflammatory action, of which, universal tumefaction of the membrane, and sometimes black or livid spots, produced by the infiltration of the subjacent tissue with dark blood, are the unequivocal signs.

Such are the appearances which characterize erythemoid inflammation of mucous membranes: all are of great value, in deciding the question as to the existence of inflammatory action, a point in the determination of which great caution should ever be observed.

The anatomical characters of chronic inflammation of mucous membranes differ in some essential particulars from the acute, the appearances varying according to the stage and duration of the inflammation. It occurs in patches or stripes, the intervening portion of the membrane preserving its natural pale colour. In the more recent cases, the colour is of a dusky red, inclining to a mahogany tint: the substance of the membrane is thickened and increased in density, the mucous follicles are slightly enlarged, and the secretions are copious, viscid, ropy, or puriform, as in chronic ophthalmia, bronchitis, gonorrhœa, or catarrh of the bladder. When the inflammation has been of longer duration, the dusky redness of the former stage passes into an ash-grey colour, interspersed with black spots or streaks, which gives the membrane a dark mottled appearance. The thickening also not only disappears, but the membrane becomes even thinner than natural, and sometimes considerably softened; this softness, when combined with serous infiltration of the submucous cellular tissue, is the cause of the mucous being so easily detached from the muscular coat, and gives the internal surface of the membrane an œdematous appearance. In cases of inflammation of the mucous membrane of long standing, this tissue is sometimes still more altered in structure; it becomes hyper-

trophied and indurated; its colour changes to a grey white; its surface appears rugous and granular; and, finally, effusion of an albuminous matter, between all the coats of the intestine at the points of disease, obliterates the structure so entirely, as scarcely to leave any traces of its original configuration. Vegetations resembling warts are also in those latter instances not unfrequently found on the mucous surface. These appearances, which affect exclusively villous membranes, may be often observed in cases of chronic dysentery.

2. *Pseudo-membranous inflammation.* Mucous as well as villous membranes, when acutely inflamed, effuse a concrete fluid, which, neither in appearance nor in chemical properties, can be distinguished from that which is formed by serous membranes.

It has been affirmed by Bichat and others that mucous membranes do not effuse lymph or contract adhesions. On this subject Dr. Craigie observes that the question of adhesion depends not so much upon the fact of albuminous exudation as upon the anatomical disposition of the cavity or canal, whether it be sufficiently small to favour the approximation of opposite and corresponding surfaces. Thus in the gastro-intestinal mucous membrane, which is in general capacious and distended either incessantly or frequently with foreign bodies, mutual approximation is too imperfect to admit of adhesion. Yet by some observers this is asserted to have happened. In situations, on the contrary, in which mucous surfaces line narrow tubes, as the lachrymal duct, the Eustachian tube, the urethra, and perhaps the fallopian tubes, obliteration of the canal by adhesion of its sides is more frequent.

It is certain that the surgeon has not unfrequently occasion to observe corresponding points of narrow canal, as the urethra, adhering apparently by concretion of its sides. Dr. Craigie concludes from these facts that the assertion of Bichat, of the inaptitude of mucous surfaces to adhere, requires some limitation; and from other facts, he is disposed to infer that one of the conditions necessary to the albuminous exudation and the subsequent concretion of mutual surfaces, consists in the destruction of the mucous epidermis by abrasion or ulceration.

These false membranes adhere in some instances to the mucous surface by which they are effused, and often form an exact mould of the cavity or canal in which they occur: they are of a much softer texture than the false membranes which exude on inflamed serous surfaces, and have no trace of organization. When this membraniform exudation succeeds to acute inflammation of the mucous membrane of the mouth and pharynx, it constitutes that disease which Bretonneau describes under the name *Diphtheritis*, which first appears in the form of small points or streaks of redness of the mucous membrane, but without much swelling; this is succeeded by the exudation of isolated white spots, chiefly on the follicles at first, which gradually increase in number, and cohere in patches, occupying a more

or less considerable portion of the surface of the uvula, tonsils, and posterior pharynx. These membranous formations, when detached, vary in thickness, but are generally white and transparent; when they are of an ash-grey colour, this arises from their being tinged with blood. This colour, and their being often accompanied with fetor, render them liable to be mistaken for gangrenous sloughing of the mucous membrane of the throat. They may be confined to the mouth and pharynx, or they may extend and dip into the larynx, cesophagus, nasal fossæ, or Eustachian tube, and when they are thrown off, are in some cases renewed several times. Andral met with a case of inflammation of the pharynx with membranous exudation on the palate and tonsils. The inflammation spread to the larynx, and destroyed the individual. On opening the body, false membranes were found not only in the larynx, trachea, and bronchial tubes, but on the inner surface of the nostrils and around the ethmoid cells. The inflammation in this case had thus spread from the pharynx to the vocal and respiratory organs, and into the cavity of the nose.*

The air-passages are more frequently covered with false membranes than any other mucous surface; and it may be observed that children are more subject to affections of the mucous membrane of the air-passages—the formation of false membranes is consequently more common at this than at other periods of life. When they form in the air-passages, they vary in thickness and consistence; some are transparent, and of extreme delicacy; others are several lines in thickness, and so consistent, that they can not only be removed entire, but afterwards preserve their moulded form. A viscid fluid is interposed between the inflamed surface and the false membrane, by which their adhesion is prevented: in some instances minute filaments have been observed in these exudations, by which it has become united to the surface on which it has formed.

We have already mentioned that the membrane which is formed in diphtheritis sometimes dips into the upper part of the larynx. Inflammation of the mucous membrane of the larynx is, however, seldom followed by membranous exudation, but generally, when intense, the inflamed membrane is covered with thick viscid or semi-puriform fluid, which is most abundant in the sacculi of the larynx. Minute portions of fibrine may be occasionally effused, and give a greater degree of consistence to the exudation. The pathology of these cases is, however, very different from that of laryngitis, in which the inflammation is seated in the submucous cellular tissue by which the mucous membrane is united to the cartilages of the larynx.

In tracheitis, or croup, the inflammation is followed by the rapid exudation of a tenacious membranous substance, which is moulded to the form of the trachea. This false membrane is generally limited to the trachea and of a tough consistence: when it extends to

* Arch. Med. 1825.

the bronchia it is much softer, and in the smaller bronchial tubes it becomes quite fluid. The impediment to the respiration in croup is to be attributed in a great measure to the presence of these false membranes, but also to the swelling of the tracheal membrane, and to the bronchitis which very often accompanies the disease. The spasmodic affection of the muscles of the larynx, which occasionally accompanies croup, adds much to the sufferings and danger of the patient: when the disease proves fatal, the death is owing to the mechanical obstruction of the air in the trachea and bronchial tubes by the false membranes.

The formation of false membranes is also a consequence of inflammation of the gastro-intestinal mucous membrane; and, as noticed by Andral, it occurs more frequently in its supra-diaphragmatic than in its infra-diaphragmatic portion. In children, the mouth, pharynx, and œsophagus are occasionally lined with a membraniform exudation, which terminates abruptly before it reaches the stomach. After puberty, these formations are equally uncommon, either on the internal surface of the stomach or intestines, Andral having never seen any either in the stomach or small intestines, and in only two instances had he observed false membrane lining the large intestine. Cases, however, of this kind have been observed in adults. We lately attended a female who frequently voided a considerable quantity of false membranes from the bowels. They appeared, from their size and form, to have been effused on the mucous surface of the small intestines, and evidently, from the history of symptoms, were the result of chronic gastro-enteritis. The disease disappeared after repeated local detractions of blood from the surface of the abdomen, counter-irritation, and a bland diet.

Andral mentions a remarkable case of a young girl of twelve years of age, in whom all the air-passages were lined with false membranes; they were found also in the pharynx, œsophagus, and stomach, where they existed in the form of large bands, extending from the cardiac to the pyloric orifice, beyond which point they did not reach. The mucous membrane was much more red beneath than in their intervals.

Pathological writers allude to the discharge of portions of the mucous coat of the bladder. There can be little question, we presume, that these morbid products are false membranes which have formed on the internal membrane of the bladder, and after being detached, have been expelled with the urine. The urethral mucous membrane appears to assume the puriform secretion rather than exudation of lymph. The inflammation frequently extends to the sub-mucous cellular tissue, and by infiltration and thickening of this structure, contraction or stricture is induced.

False membranes occasionally form in the cavity of the uterus, in consequence of an irritated or inflamed state of the uterine mucous membrane. These membranes are sometimes thrown off in detached shreds after painful

menstruation, or at irregular periods, when the internal surface of the uterus is inflamed. In some instances, they bear the exact mould of the cavity of the uterus, and have such a degree of consistence as to admit of manual examination and even preservation in alcohol. Sterility is a common effect of these false membranes of the uterus.

3. *Pustular inflammation* has its seat chiefly, if not entirely, in the mucous crypts or follicles. We not unfrequently meet with a simple enlargement of these glandular organs (glandular so far as they are connected with a secreting function), in certain forms of fever, as well as in other anomalous affections. When acute inflammation attacks one of these follicles, it becomes enlarged, swollen, and vascular. The mucous membrane and subjacent tissue soon exhibit marks of the inflammatory action; and when the membrane is villous, the villi are red and increased in size. A pustule is formed, round and prominent, more or less acuminate; and if a set of aggregated follicles become inflamed, the pustule is more flattened, and has a larger circumference. Frequently we find on the apex of these bodies a minute orifice, indicated by a dark spot, through which by pressure we soon squeeze out a mucous or puriform fluid, whilst in others we cannot observe any trace of an orifice.

The pustules of mucous membranes which we have most frequently an opportunity of examining, are those more especially seen in the membrane of the mouth and pharynx. They are usually known under the name of aphthæ, and are essentially the same in their mode of origin, as those which are developed on the deeper-seated membranes.

The pustules on the inner surface of the intestinal tube often appear in a form nearly resembling that of the variolous pustule. The occurrence of these intestinal pustules in connexion with fever has been minutely noticed by Ræderer and Wagler in their history of the Gottingen epidemic, and afterwards by Petit, Pinel, and others. They have been supposed to coexist frequently with the cutaneous eruption of small-pox, and we may add, that although this is not a very frequent occurrence, yet a sufficient number of cases are on record to establish the fact.

We may, however, state that the possibility of the existence of pustules on a membrane devoid of an epithelium has been called in question. But if it be considered how numerous are the mucous crypts, and that in general, if not always, the pustule (so called) is found to occupy one or more of these, we can have no difficulty in accounting for its formation. In some instances, the apex of the pustule presenting a minute opening, in others that opening being closed by adventitious membrane, the follicular pustules of mucous membranes may be said to correspond in every respect with the pustules of the follicles and sebaceous glands of the skin, as exemplified in acne, mentagra, porrigio, and some varieties of impetigo. The analogy between the pustules that occur on membranes provided with epithe-

lion and those of the skin is sufficiently obvious.

It may be mentioned that the most constant and frequent locality of pustular inflammation in the intestinal canal is about the cæcal half of the ileum. This is the form of disease described by Bretonneau under the appellation *Dothincnteria*. (See FEVER.)

4. *Ulcerative inflammation*. After a pustule is fully formed, its centre soon becomes depressed, and it loses its conical form. In some cases, this depression is owing to an enlargement of the orifice of the follicle, but more frequently it is produced by an incipient ulcer. The increase of this depression, and the gradual disappearance of the pustule, indicate the progress of the ulcerative process; finally, a circular ulcer, or when several follicular ulcers cohere, a patch of ulceration occupies the site of the original pustule. This is the most frequent commencement of ulcers of mucous membranes: their numerous variations of form, extent, and depth, are dependent on the intensity of the inflammation, and the extent to which the neighbouring tissues are involved. Ulceration of a mucous surface does not always originate in the follicles: it is sometimes the result of acute inflammation of both mucous and villous tissue; or of small sloughs, or even of an inflamed or diseased condition of a subjacent tissue; as, for instance, when a tubercular deposit in that tissue acts as a source of irritation to the mucous membrane.

Andral reduces the forms of those ulcers which are met with in the intestinal canal, to the following:—1. The circular form, remarkable for their great regularity. 2. The oval form, particularly noticed in the ulcerations of Peyer's glands. 3. The linear form, the ulcer appearing as a groove or fissure. 4. The irregular form, the margin being jagged. This latter form occurs most frequently.

Ulcers of mucous membranes, when considered as to their depth, or as to the nature of their surface, present many varieties, from simple erosion to the complete destruction of the mucous tissue. Thus, in some there is merely so much of the surface of the membrane eroded as to prove the existence of a solution of continuity: if the membrane be covered with epithelium, it is also removed by the ulcerative process: if it be a villous membrane, the villi are likewise destroyed. This form is the result of an inflammation of slight extent. It is more frequent in its occurrence than is generally thought, as from its superficial nature it is very apt to be overlooked. The floor of the ulcer may be formed by the mucous corion as above described; but when the ulceration is deeper, so as to destroy the corion, the sub-mucous tissue is the foundation of the ulcer, which varies in colour, consistence, or thickness. Sometimes the muscular tissue forms the bottom of the ulcer: this state is met with in fever and in some severe forms of dysentery; not only is the superincumbent tissue removed in these cases, but that which passed in between the fibres of the muscles is, as it were, dissected out. The muscular tissue being destroyed, the

bottom of the ulcer is formed by the serous coat of the intestine. These cases often terminate in perforation of the intestine, whether by rupture of the delicate serous membrane, or by an extension of the destructive process to it. The probability of the occurrence of perforation depends, not on the extent or long duration of the ulcer, but on the rapidity with which it burrows.

The possibility of the cicatrization of ulcers of mucous membranes has been disputed: recent observations have, however, fully attested the fact of their cicatrizing. The case of the late Professor Beclard, so well known by reason of the celebrity of the distinguished individual who was the subject of it, would alone prove the fact. This able anatomist, at one period of his life, laboured under marked symptoms of gastric inflammation, which yielded to an active treatment and rigid regimen. Some years after, upon the occurrence of his death from a totally different affection, a distinct cicatrix was found in the small curvature of the stomach. Besides this well authenticated case, the testimony of Troillet, Louis, and other pathologists, leaves no longer any doubt on this subject.

The gastro-intestinal mucous membrane is by far the most frequent seat of ulceration. Next in point of frequency are the buccopharyngeal and laryngeal membranes; while the bronchial and urino-genital portions rarely exhibit ulceration.

Nervous tissue. Acute inflammation of the brain is comparatively rare as an idiopathic disease, but is often the result of external violence, in which case it is generally partial or circumscribed. Examples of general cerebritis are not uncommon as one of the complications of fever; on examination the brain presents general vascularity, but the congestion is greater in the arteries than in the veins; when the blood is accumulated chiefly in the veins and sinuses, it indicates that the lesion partakes more of the character of venous congestion than of inflammation.

On cutting into a portion of inflamed brain, numerous red spots appear, the blood oozing from small vessels, which in the healthy state convey only the colourless part of the blood. The cerebral pulp is at the same time infiltrated with minute effusions or spots of blood, which give it a striated, or when the spots are numerous, a marbled appearance and when in still greater numbers, they form small coagula. These bloody effusions, which may occupy a considerable part of one hemisphere, or only a small portion of the brain, extend more or less in breadth, and give rise to the various shades of redness observed in the section of a portion of inflamed brain, the grey or cortical substance assuming, when inflamed, a dark red or brownish colour, and the medullary a light rose tint.

The highest degree of inflammation which is compatible with the organization of the cerebral tissue is never general, but confined to portions of the brain of various extent, around which the tissue presents the characters of in-

flammation in a more moderate degree. These inflamed portions, which acquire a certain degree of firmness and elasticity, are not exactly circumscribed, but are continued and blended with the surrounding tissue, the traces of inflammation being gradually lost in the healthy structure. In subacute or chronic inflammation of the brain the anatomical appearances are much the same as in the acute, but its duration gives rise to important modifications. The redness soon changes to a crimson, purple, or light brown tint; this change of colour is followed by a diminution in the consistence of the inflamed structure, varying according to the duration of the inflammation, from slight though evident softness of the cerebral tissue to pulpiness, or even semi-fluidity. At the utmost limits of moderate inflammation, a slight though evident softness (*ramollissement*) may be remarked, and only recognized by comparing the softened with the healthy portions of the brain. This incipient stage of softening, which we have repeatedly observed in continued fever, is ascribed by some writers to the infiltration of the inflamed tissue with serous fluid, a supposition rendered extremely probable from the circumstance of the portion of the pia mater which invests the softened pulp being at the same time infiltrated with serum. When the inflammatory action has been still more intense, the structure of the brain is not only softened, but disorganized and infiltrated either with blood or pus. When blood is diffused in the disorganized pulp, it constitutes the *red* softening, in contradistinction to that form in which globules of pus are mixed with the broken-down cerebral mass, which, from the colour it acquires, is termed *yellow* softening of the brain.

The red and yellow softening are sometimes combined in the same morbid mass; blood, pus, and brain being thus blended together, and giving the cerebral tissue a dirty grey appearance, the shade varying according to the proportion in which they are mixed.

There is another kind of softening which, though analogous, differs in many respects from either of the preceding—the *white* softening, in which the cerebral pulp is disorganized and infiltrated with serous fluid. It occurs chiefly in isolated parts of the medullary substance, very often in the corpus callosum, fornix, and septum lucidum. The diseased portions are usually of a pure white colour; but when the cortical substance is affected, it inclines more to a yellow or grey tint. This form of softening is often observed in elderly subjects, and is generally accompanied with serous effusion in other parts of the brain; it is also believed by some pathologists to form one variety of hydrocephalic disease.

Softening of the brain occurs more frequently in the cineritious than in the medullary part, the cineritious substance being from its great vascularity predisposed to inflammation: of the central parts of the brain, it is found more frequently in the septum lucidum, corpora striata, optic thalami, central part of the hemispheres, cerebellum and crura cerebri, and,

according to Dr. Craigie, in the order now enumerated.

There is another alteration of the brain consequent on inflammation—infiltration of the cerebral tissue with pus, which is in some instances diffused in drops through its substance; in others the purulent fluid is confined in distinct cavities of various sizes, the boundary being formed either by the substance of the brain itself, (*undefined cerebral abscess*), or by an organized cyst (*encysted cerebral abscess*).

Though suppuration may take place in any part of the brain, purulent collections are more frequently met with in the hemispheres. They are occasionally the result of acute, but more generally of chronic cerebral inflammation; their progress is slow, and the symptoms, which are always very obscure, vary according to their extent and situation.

Abscesses have been found in the cerebellum by various pathologists, the pus being generally confined in an organized cyst.

Induration has been mentioned as an effect of cerebritis, though some authors deny that it is the result of inflammation or of capillary injection. The fact, however, of its being accompanied with injection of the capillaries, and that the symptoms during life were those observed in chronic inflammation of the brain, are strong presumptive evidence of its inflammatory origin. The induration, which may be general or circumscribed, varies from the consistence of wax to that of cartilage.

Ulceration has been stated to be one of the terminations of inflammation of the brain, and without asserting that this lesion never occurs in the brain, we are inclined to think that some of the older authors have described *softening* as ulceration of this organ. In the cases which bear the greatest analogy to erosion, the ulcerative process appears to have commenced at the convolutions, and to have been connected with circumscribed inflammation of the pia mater.

Gangrene of the brain is very uncommon. It is described by Baillie,* who states that portions of the brain occasionally become gangrenous after violent injuries of the head, but that it is extremely rare when the inflammation arises from any other cause. He mentions one case which had fallen under his observation, in which the mortified part of the brain was of a very dark brown colour, and as soft as the most rotten pear. A similar case, succeeding to injury of the head, is given by Saure,† in which the substance of the brain was black and gangrenous to the depth of three fingers' breadth.

The spinal marrow being similar in structure to the brain, is consequently liable to the same morbid changes; our knowledge of its lesions, however, is more incomplete, less attention having hitherto been paid to their investigation. The various morbid changes which have been described by pathologists originate in inflammation either of the mem-

* Morbid Anatomy.

† Mem. de l'Acad. de Chir. tome i.

branes or substance of the cord; indeed, though the spinal marrow is enveloped with the same coverings as the brain, inflammation is seldom confined to either the membranes or the substance of the cord, but appears to affect both the one and the other at the same time. Those cases, which have been detailed as examples of meningitis of the cord by Abercrombie and other writers, confirm this observation.

In inflammation of the spinal marrow, the membranes and substance of the cord are much injected. The inflammatory action is soon followed by softening of the spinal marrow for a greater or less extent; sometimes the softening is limited to a very small portion: in other cases it extends throughout the greater part of the cord. Blood is sometimes mixed with these softened portions, constituting red softening; and when pus is intermixed, it gives rise to yellow softening. In some instances, the spinal canal contains a quantity of serous fluid, or a layer of puriform fluid is occasionally spread on the membranes, the pus being occasionally mixed with blood, but without apparent softening of the cord. These cases constitute undefined sup-puration or abscess of the cord.

The tissue of nervous cords and their minute filaments becomes occasionally inflamed, and gives rise to a variety of acutely painful sensations. This affection may have a spontaneous origin, but it is more frequently produced by punctured, lacerated, or contused wounds, or by the application of a ligature, as in the common accident of including a nervous twig in tying a bloodvessel for the suppression of hemorrhage or the cure of aneurism. In these cases it is supposed that inflammation is produced in the neurilema or covering of the nerve, which becomes vascular, indurated, and painful. We have an example of spontaneous neuralgia or nerve-ach in sciatica, in tic douloureux, and neuralgia of the median nerve in the arm, and posterior tibial nerve in the leg. These neuralgic affections may also arise from external violence applied in the vicinity of their origin, and of those parts in which they ramify.

Inflammation of nervous tissue may terminate in resolution, in effusion of lymph around the nerve, in ulceration, and in enlargement of the nerve from deposition of new matter. This latter state sometimes succeeds to amputation; the extremities of the nerves become inflamed, and finally much enlarged and indurated—the consequences of chronic inflammation of their neurilema.

Vascular system. Notwithstanding the important share the bloodvessels have in the pathology of inflammation, they are not themselves very often the subject of this action. There is still much difference of opinion among pathologists as to the precise anatomical appearances which should be considered as indicating inflammation of bloodvessels, some attaching no importance to changes in colour and consistence, which others deem impor-

tant lesions and the cause of many serious diseases.

The following are, however, the characters of acute inflammation of a large bloodvessel: redness, rugosity, thickening and softening of its internal membrane, the coagulated blood adhering to it either immediately, or through the intervention of a layer of effused lymph: the middle and outer coats are also injected, thickened, and lacerable, and the consistence of the vessel is so much diminished that it is very easily torn.

1. *Inflammation of arteries.* Though arteritis was considered by Laennec a very rare disease, subsequent investigations have proved that it is not altogether so uncommon as this celebrated pathologist was inclined to believe. The larger arterial trunks have been found more frequently inflamed than the smaller branches; indeed, from the silence of authors on the subject of inflammation in the smaller arteries, it may be concluded that it very seldom occurs.

Arteritis may be either acute or chronic. In acute arteritis the internal membrane is of a bright red colour, and evidently swollen. It is sometimes difficult to determine, whether the redness in the internal membrane of the heart and the larger arteries arises from inflammation, or is the effect of imbibition or staining. When the redness is not accompanied with vascular injection, tumefaction, and alteration of tissue, more particularly when it is circumscribed and terminates abruptly, or appears in patches, it is to be ascribed to imbibition from contact with the blood contained in the artery. When the redness arises from inflammation, the membrane loses its polished and glistening appearance, has a villous aspect, and is easily detached from the other coats. The vasa vasorum also become more numerous and injected, and although it is often difficult to recognize these vessels in the centre of an inflamed membrane, they become clearly developed at its limits. The redness of inflammation differs also from that of imbibition in presenting various tints in the different coats, whereas inflammatory redness preserves the same colour in all. It is, therefore, now agreed that redness of the internal membrane of the heart and arteries, unaccompanied by any other anatomical characters of inflammation, cannot be deemed evidence of arteritis. In inflammation of arteries the redness is accompanied with thickening and swelling of the inner membrane, effusion of lymph either on its free or adherent surface, and increased vascularity with softening of the middle coat, so that the internal and middle tunics present all the ordinary characters of adhesive inflammation. In genuine arteritis, too, the coats are easily detached from each other, and some writers have observed, in intense cases of arterial inflammation, purulent effusion or infiltration between the coats, but more frequently purulent exhalation from the surface of the internal membrane.

Chronic arteritis is also chiefly confined to the

larger arteries, being seldom if ever met with in the smaller arterial tubes. The chief feature of chronic inflammation of the inner membrane of the heart and arteries is redness, but even in recent cases it is more deep than in acute arteritis. When the disease is of long standing, the membrane becomes of a dusky red or brown shade, rugous, and generally softened. These appearances are more remarkable in the vicinity of calcareous, bony, and other morbid deposits, from which circumstance many pathologists have concluded that chronic inflammation is the original source of these organic lesions in arteries. Without attempting to deny the possibility of this origin of these deposits in inflammation, we may remark that their primary formation is not in the inner membrane, but either in the middle coat or in the delicate cellular tissue, which connects the middle to the inner tunic, and that this coat can often be detached from these deposits. Besides, in endeavouring to come to a correct conclusion on this subject, it is to be kept in mind that these various morbid alterations in the arterial coats, whether steatomatous, cartilaginous, calcareous, or bony, form in detached points remote from each other, and without any appearances which indicate the previous existence of inflammatory action. Laennec states that though we know not the nature of the derangement of the economy that produces an ossification or a cancer, it is certainly not the same as that which produces pus. Other writers have endeavoured to clear up the difficulty by supposing that all these morbid changes, which are not the usual products of common inflammation, are the effect of *specific* inflammation; the calcareous deposits, for example, requiring the gouty diathesis for their elaboration; so that, according to this view, every variety of deposition must be the result of a different specific inflammatory action. (See ARTERITIS.) In whatever way these morbid productions are originally formed, the irritation they induce in the arterial coats is evidently a source of chronic arteritis, which may terminate in ulceration.

2. *Inflammation of veins.* This is a more frequent and fatal disease than that of arteries. Though frequent allusions were made to this lesion, the first distinct account was given by the late John Hunter, in a paper in the Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge, in which many of the most important facts connected with inflammation of veins are clearly pointed out. Since the time of Hunter, many valuable contributions have been made to this department of pathology by Meckel, Breschet, Bouillaud, Velpeau, Dance, Ribes, Hodgson, Davis, Trauers, Arnot, and Lee.

The anatomical characters of an inflamed vein are, uniform redness more or less deep, with swelling and pulpiness of the inner coat, which is easily detached from the middle tunic. The redness and swelling soon extend to the middle and outer coats, so that the vein feels hard and contracted, resembling a deep red cord,

imbedded in its cellular sheath, which is generally infiltrated with bloody serum.

The canal of the inflamed vein is filled with coagula of blood often mixed with pus, or a false membrane adheres to the inner membrane, filling its cavity completely, and rendering the vessel an impervious cord.

When a vein becomes inflamed after a wound or puncture, the inflammation sometimes extends along its inner or lining membrane to the principal venous trunks, and occasionally to the membrane which lines the cavities of the heart. From the facts adduced by Mr. Arnot, it appears that there are considerable differences in the extent of vein occupied by inflammation in phlebitis. In some instances the inflammation is limited to the vessel in which it originally appeared; in others it is found to have spread into several or most of the veins of a limb, from that primarily affected. These circumstances, as well as the fact that death has resulted from phlebitis limited to a few inches only, lead to the conclusion that the danger from this disease bears no ratio to the extent of the inflammation of the vein.

The anatomical appearances of an inflamed vein are uniform deep redness of the inner membrane extending over a limited or more extended portion of the vessel. The coats of the vein are generally swollen and indurated, and more easily separated than in the healthy state. The dense cellular substance in which the vessel is imbedded, is at the same time injected and infiltrated with bloody serum. The cavity of the vein is filled with coagula, with which purulent matter is occasionally blended, and its diameter contracted or often obliterated by false membranes which adhere to the surface of the inner coat, and thus render the vessel a hard impervious cord. In fourteen cases out of nineteen, Mr. Arnot found pus, or pus mixed with lymph, in the cavity of the vein; in two the contents are described as consisting of "adhesive matter," and in another the vena cava contained "flakes of lymph." In one case, described by Mr. Hodgson, in which the inflammation occurred in a vein previously diseased, neither pus nor lymph was found in the vessel.

The characters of chronic inflammation of veins differ little from the acute. The redness is of a more deep brown or violet tint, and the coats more thick, so that when the vein is cut across, it preserves its cylindrical form like an artery. The contents of the vein are similar to those described in acute inflammation.

Ulceration occurs more frequently in the larger arterial trunks than in the veins. We have already noticed ulceration of the internal membrane of the heart as an occasional consequence of inflammation. In arteries, the ulceration may be confined to the internal tunic alone, or it may extend to and destroy the muscular coat, so that the blood escapes through the erosion, and, distending the external coat, gives rise to the aneurismal dilatation so minutely described by Scarpa, and which indeed, in the opinion of this pathologist, con-

stitutes the true anatomical character of aneurism. In process of time, however, or from violence, the external coat may be lacerated; the blood then escapes into the cellular sheath in which the artery is enveloped, and thus a true aneurismal tumour is formed.

When ulceration of the larger veins has been observed, it has apparently commenced in the internal lining membrane, and gradually extended to the other coats. The vein has sometimes formed an attachment to some adjoining hollow viscus, the tissue of which becomes also destroyed by ulcerative absorption, and the blood thus escapes into its cavity.

Bloodvessels may be said to be insusceptible of gangrenous inflammation, as they escape the general destruction of the tissues in mortification and sphacelus. It is extremely doubtful if the tissue of the heart be ever affected with gangrene, the cases mentioned by Senac, Portal, and Corvisart, in which gangrenous spots were seen on the surface of the heart, being too vaguely described to be admitted as examples of this lesion.

The tissue of arteries seems to have great power in resisting mortification. Dr. Thomson states that he has seen instances of phlegmonous erysipelas, in which several inches of the femoral artery were laid completely bare by the gangrene, ulceration, and sphacelus of the parts covering it, without its giving way before death. The arteries had the appearance of raw flesh, and were obviously thicker and more vascular than natural, the blood circulating through them, and assisting in supplying with nourishment the parts on which they were distributed. When gangrenous inflammation has been so severe that it extends to the bloodvessels, it has been observed that hemorrhage does not take place, either when the vessel is divided, as in amputation of the limb, or when the limb has dropped off. The blood is prevented from escaping in those cases partly by the extension of adhesive inflammation, which occurs in the line of separation between the dead and the living parts, to the bloodvessels of the limbs, so that their surfaces are pressed together, and adhere more or less completely, and partly also by the coagulation of blood in the extremity of the vessels. This filling-up of an artery by coagulated blood happens, Dr. Thomson conceives, by the closure, by adhesive inflammation, of the small branches going off from the trunk, and by the disposition which is given to the blood to coagulate, in consequence of the secretion of coagulable lymph on the inner surface of the inflamed vessel.

Inflammation of the lymphatic vessels.—This system of vessels is not unfrequently inflamed; and, according to Bichat, inflammation occurs more frequently in the absorbents than in the veins. This assertion is corroborated, when we reflect that the absorbents are constantly exposed to irritation from wounds, punctures, and the introduction of morbid poisons into the system through the external surfaces. Though inflammation of the absorbents is by no means a rare disease,

it seldom proves fatal, the inflammation generally terminating in resolution. In those cases in which an opportunity has been afforded of examining an inflamed absorbent, its coats have been found swollen and indurated, and a layer of plastic lymph adhering to its inner membrane. The cellular tissue surrounding the inflamed vessel is involved in the inflammatory action, denoted during life by a red line, which is exquisitely painful, and after death by induration and serous infiltration.

Andral has examined the thoracic duct and lymphatic vessels in upwards of six hundred subjects, and found but in a very few instances any appreciable alteration of the thoracic duct. In three cases only its parietes appeared red and injected; and in one of these the interior of the duct was filled with pus, and its coats were thickened and friable. In the case of a woman, who died at La Charité, with cancer of the uterus, the thoracic duct, which was considerably enlarged, and of a dead white colour, was filled with a puriform fluid, and its internal surface studded with an infinite number of round white bodies about the size of peas; in the intervals between which the parietes of the duct were thickened, and of a dead white colour, traversed here and there by reddish lines, and in other points they were reduced to a soft pulp of a dirty reddish white. The left subclavian vein, into which the duct opened freely, was distended by a number of dense firm clots of blood firmly adhering to the coats of the vein, the inner surface of which was wrinkled, and of a deep brown colour. This affection of the thoracic duct and subclavian vein evidently originated in inflammation. Andral has occasionally met with the same morbid changes in the lymphatic vessels.

Inflammation of the lymphatic ganglions is more common than that of the lymphatic vessels. Those ganglions are composed of two distinct tissues,—lymphatic vessels variously convoluted, and cellular tissue, by which these convolutions or ganglions are united. These distinct structures may be demonstrated in the human subject by anatomical injection and nice dissection, and the various diseases to which these ganglions are liable originate in one or other of those two anatomical elements. Inflammation of the lymphatic ganglions, which may be propagated from the lymphatic vessels, or arise primarily in the ganglions, is characterized by redness and swelling. The inflammation may be confined to one ganglion, or it may extend to several. The enlargement apparently arises from tumefaction of the cellular tissue, which unites the convolutions of the lymphatics, or from thickening of their coats, as a mercurial injection passes freely through all the convolutions of an inflamed lymphatic ganglion, proving that their cavity is still pervious.

When an inflamed ganglion is cut into, a number of small brownish red points are seen on the divided surfaces; these are exudations from the divided bloodvessels, which have become diffused in the red substance

of the inflamed ganglion. When the inflammation is more intense, the consistence of the ganglion becomes of a dark violet colour, spongy and soft, and often mixed with blood.

When the inflammation terminates in supuration, the pus may be infiltrated in cellular tissue connecting the convolutions, or in the structure of the ganglion, giving it a dirty grey or ash colour. In other cases an abscess forms, so that all traces of its parenchymatous structure are lost, the cellular envelope of the ganglion alone remaining and forming a cyst to the abscess.

When lymphatic ganglions are affected with chronic inflammation, the swelling and hardness are greater than when the inflammation is more acute. The cellular tissue, in which they are enveloped, becomes also inflamed, and forms a dense capsule around the ganglion. Lymphatic ganglions may enlarge in groups, as when the mesenteric glands become enlarged from follicular ulceration, or in chronic non-suppurating buboes of the axilla or groin. When an incision is made into a ganglion affected with chronic inflammation, it presents a dense homogeneous structure of a brown red colour, the vessels with which it is traversed being increased in number, tortuous and dilated, ramifying in all directions, and interspersed with white cellular filaments.

Chronic inflammation of lymphatic ganglions seldom terminates in supuration unless acute inflammation supervene. The pus in these cases is infiltrated in the cellular tissue covering the inflamed ganglion.

Inflammation of muscular tissue. From the comparatively few opportunities of examining inflamed muscular tissue in the human subject, it has been necessary to institute experiments on the lower animals, with the view of ascertaining the appearances this tissue presents when inflamed. The muscular tissue itself does not seem to assume readily inflammatory action; at least inflammation does not leave any well-marked traces of its existence. The principal alteration appears to take place in the intermuscular cellular tissue, which becomes red from increase in the number and size of its bloodvessels; the muscular fibres are at the same time somewhat increased in density, while the contractility, and consequently the power of motion, is more or less impaired, according to the degree and duration of the inflammation.

Gendrin states that if a portion of the centre of a long muscle be once inflamed, its extremities alone retain the contractile power, the middle or inflamed part remaining quite motionless, although the nerve which supplies the muscle is irritated, or even when it is subjected to the influence of galvanism. As the inflammation advances in duration or intensity, the cellular tissue which enters into the composition of the muscle, as well as that which connects it to the surrounding parts, becomes swollen and infiltrated with serosity, with which a portion of coagulable lymph is generally mixed, whereby its density is not only increased, but the muscular tissue so firmly

bound and interwoven, that it is difficult to separate the two tissues, and when this is effected by dissection, the muscular tissue appears sensibly swollen, and of a more or less deep red colour. When the inflammation is intense, the cellular as well as the muscular tissue assumes a deep red or violet colour, and traces of commencing disorganization are perceptible, the muscle and its connecting cellular membrane becoming softened and infiltrated with blood. Suppuration finally takes place, the pus being diffused both in the cellular tissue which surrounds, and in that which enters into the composition of the muscle. The muscular substance becomes finally completely disorganized, and often sloughs extensively; or it is converted into a grey indurated mass, in which irregular cavities form, containing a dirty serosity or ill-conditioned pus.

It appears too from repeated experiments, that when the muscular tissue is destroyed, it is never regenerated; the lesion being repaired by the formation of a cellular or fibrous web which fills up the vacant space. There are several instances of chronic suppurative inflammation in muscle on record, the best example of which is inflammation of the *psaos* muscle, of which Schoenmezel* has given a case in which the whole of the *psaos magnus*, and *iliacus* of the right side was destroyed and converted into purulent matter, forming a sac which extended from the last lumbar vertebra along the surface of the ileum to the small trochanter.

Inflammation of the muscular tissue of the heart is acknowledged to be a very rare affection, and according to the testimony of Baillie and Laennec, when it does happen, it is never a primary disease, but the consequence of extension of inflammation of the pericardium to the muscular structure of the heart. Though cases of genuine carditis are confessedly rare, the probability of its occurrence is placed beyond doubt by the instances which have been recorded; the most satisfactory we have met with is that related by Mr. Stanley,† in which the inflammation was general throughout the tissue of the heart.

The most unequivocal proof, however, of true carditis is when the inflammation terminates in suppuration. In these cases the inflammation is partial, and confined to those portions of the cardiac tissue in which the pus is deposited. The abscess is unencircumscribed, the purulent matter being infiltrated in the cellular membrane which connects its muscular fibres.

Ulcers of the heart have been found both on its external and internal surface, though this lesion also has been very rarely observed. The only case Laennec ever met with occurred on the internal surface of the left ventricle; it was an inch long, and half an inch wide, and more than four lines deep in the centre. This ventricle, which was at the same time in a state

* De musculis psoa et iliaco suppuratis, Heidelbergæ, 1776.

† Med. Chir. Trans., vol. 7.

of hypertrophy, ultimately ruptured. The patient survived only two days.

Inflammation of the tongue (*glossitis*) is a very formidable disease, whether we regard its effects on respiration or deglutition. The organ, when inflamed, becomes swollen, of a vivid red colour, and very painful; as the inflammation proceeds, the swelling increases often to such a degree, that the tongue is thrust out of the mouth, and by its pressure on the larynx impedes both respiration and deglutition. The inflammation may terminate in resolution, suppuration, or even gangrene. The first is the more frequent result, which the practice of making deep incisions into the inflamed tongue tends greatly to promote. When suppuration takes place, the abscess is sometimes superficial, so that it points, and may be opened by an incision. In other instances it is deep-seated, and from the increased swelling there is so great hazard of suffocation, that, if deep incisions made into the tongue do not reach the abscess, it may become necessary to open the windpipe to save the patient's life—an operation which has been repeatedly performed with success in such cases. Gangrene is a rare termination of glossitis, and is indicated by the dark livid colour of the tongue, and the gangrenous odour from the mouth. (See *GLOSSITIS*.)

The uterus being a muscular organ, is liable to the effects of inflammation of this tissue. Uterine inflammation is generally partial, occupying particularly the fundus and posterior part of the organ, and is almost invariably accompanied with inflammation of that portion of the peritoneum which covers its fundus. Its vessels are at the same time gorged with blood; the internal membrane of the organ is of a violet red colour, the injection of the muscular substance giving it a vermilion red or livid hue, according to the duration of the disease; and when blood is extravasated, the portion of the tissue in which this takes place appears marbled, and of a soft spongy consistence. In the more advanced stage of uterine inflammation pus is infiltrated through its substance, and is generally found at the same time in the uterine veins.

Ulceration is another effect of inflammation of muscular tissue. This is sometimes observed in deep ulcers of the extremities, which corrode in succession the skin, cellular membrane, fascia, and ultimately the muscular tissue. It is also observed in the tongue in idiopathic inflammation of this organ, or when it arises from the use of mercury. We have already seen that ulceration occasionally takes place in the heart, and chronic ulceration of the cervix of the uterus is familiar to every pathologist.

Gangrenous inflammation of muscular tissue occurs in the external muscles, as well as in internal organs which have a muscular formation. This lesion is recognized by the black or green colour of the muscular fibres, which are very soft and easily torn, and by the peculiar gangrenous odour of the sphacelated part. When gangrene occurs in an external muscle, the sphacelated portion may slough off,

and the patient ultimately recover. If the sphacelus be extensive, it generally destroys life. Gangrene of an internal organ is almost invariably fatal.

Fibrous tissue. Bichat included under this term, *tendon, ligament, fascia, aponeurosis*, and *periosteum*, in which arrangement he has been followed by succeeding anatomists. This general arrangement, however, has been disputed by Dr. Craigie, who regards the anatomical structure of those several tissues, as well as the chemical composition of some of them, so essentially distinct as to preclude this general classification. For example, the structure of tendon differs from that of ligament and periosteum in being united in regular parallel fibres, and having greater tenacity—the fibres in the latter crossing in all directions, and consequently being with difficulty separated. Inflammation of fibrous tissue is attended with the ordinary effects of inflammation, but it rarely if ever terminates in suppuration or ulceration. We shall examine the effects of inflammation in individual fibrous tissues.

In inflammation of tendon, the natural polished glistening appearance is lost, and is succeeded by faint redness; when it is more violent, this injection is accompanied by softness or pulpliness of its texture, and as the inflammation proceeds, the redness gradually passes into a leaden grey colour; the tissue of the tendon becomes subsequently much thickened, and of a doughy consistence, indicating that its vitality is lost. These changes in inflamed tendon are frequently observed in common whitlow, and in severe injuries of the extremities accompanied with laceration, but particularly in gunshot wounds.

The structure of ligament, periosteum, and fascia, especially that of the two first, is exceedingly similar. The minute filaments of which it consists are so interwoven in various directions, as to form one of the strongest and most compact tissues of the body. It is very sparingly supplied with bloodvessels, nerves, and absorbents. Inflammation of the capsular ligaments of the larger joints, or of the funicular ligaments, as, for example, the lateral ligaments of the elbow, wrist, knee, or ankle-joints, may arise spontaneously, from external injury, or from extension of inflammation of the synovial membrane or articular cartilages to the ligaments. When the inflammation is spontaneous, it is generally of a more chronic kind than when it arises from other causes. Inflammation of ligamentous tissue is speedily followed by thickening of its structure; the inflammatory action is seldom limited, but spreads to the synovial membrane and surrounding cellular tissue, giving rise to effusion into the cavity of the joint, and swelling of its external tissue, which not unfrequently terminates in the formation of superficial abscesses.

Ligamentous inflammation may terminate in resolution or in ulceration, of which latter we have an example in strumous disease of the hip-joint, in which not only a portion of the capsular ligament, but the round ligament

which connects the femur to the acetabulum, is destroyed by the ulcerative process.

Inflammation of the periosteum (periostitis) differs little in anatomical characters from that of ligament. It is never confined to this tissue, but extends to the cellular tissue by which it is connected to the skin and subjacent bone, and from which it is easily separated. A perceptible tumour is thus formed, which is hot and painful, and when examined, is found to consist of injected cellular and periosteal tissue infiltrated with serum or lymph.

Periosteal inflammation may be limited, or it may spread over a considerable extent. When it is limited to a small spot, it constitutes the swelling termed *node*, which forms more readily in some situations than in others, more particularly on the tibia, radius, ulna, clavicle, and sternum. Nodes are sometimes converted into bony swellings (*exostosis*), the lymph which is effused being mixed with calcareous matter. Periostitis sometimes terminates in suppuration and abscess, in which case the skin and cellular membrane over the diseased periosteum become red, swollen, and very painful; fluctuation is perceptible, and when the abscess is punctured, or bursts spontaneously, the corresponding portion of the bone is generally destroyed by caries. Some cases of periostitis are merely symptomatic of primary inflammation or other disease of the bone, the inflammation having spread from the bone to the periosteum.

Fascia, from its extent and importance in the construction of the body, as well as its being evidently the seat of rheumatism, requires special notice. Dr. Craigie has ably combated the idea that inflammation of the muscular tissue is a cause of rheumatism.

"Independent of the fact that the rheumatic pains occur often round joints in which there are no muscles, the theory is at best only an ingenious assumption, and is not supported by any strong facts or arguments.

"Though rheumatic pain is often referred to muscular parts, it is less frequently so than to joints and parts covered by aponeurotic sheaths and fasciæ. Of 520 cases, Haygarth observed in 388 the rheumatic action to be seated in joints, in 118 in muscular parts, and in 14 wandering, general, or migrating through the limbs. Of 170 cases, in 154 one or more joints were inflamed; in 33 cases both joints and muscles were simultaneously affected; and in some cases only were the muscles affected without the joints.

"Though from these facts Dr. Haygarth infers that acute rheumatism is seated chiefly in the joints, he does not attempt to ascertain the particular texture, in the affection of which the disease consists. It is further manifest that while it is impossible to exclude affection of the muscles entirely, it results that this affection is only secondary. The proof adduced by Dr. Scudamore from pressure of the whole course of a muscle, and grasping its substance during severe rheumatism, to shew that the fleshy part is not the seat of complaint, is entitled to attention. Combined with those

already mentioned, and with other considerations to be adduced immediately, it results that the rheumatic action is seated in a texture, which, confined neither to the site of the joints nor to that of the muscles exclusively, is common to both, and which, from its extensive distribution and complicated arrangement, accords best with the phenomena, progress, and effects of the disease. It is unnecessary to repeat the considerations above adduced from the anatomical relations and characters of fascia and its various divisions. That they are the chief seat of acute rheumatism may be inferred from the following circumstances.

"1. When the rheumatic action is seated in muscular parts, instead of being confined to the muscular fibres, it may always be referred to the aponeurotic membrane which covers or penetrates them. 2. The peculiar pains of rheumatism are always most distinct in those situations in which several folds of aponeurotic membranes meet; and their migrations may be traced from one extremity to another of aponeurotic membrane, and along the course of its principal divisions. 3. The kind of pain which attends rheumatism resembles that of the fibrous tissues in general when inflamed, in undergoing aggravation under the influence of external heat, and during the night. 4. This view of the seat of rheumatic disorder affords the most probable explanation of the effusion which takes place in the tendinous sheaths (*bursæ mucosæ*); for since each sheath is partly enveloped in aponeurotic membrane, the inflammatory process which takes place in the latter soon gives rise, as in analogous cases, to effusion, critical or non-critical, from the contiguous synovial membrane. 5. This view also affords the most rational explanation of the fact remarked by all authors, that rheumatism almost never terminates in suppuration. To suppose that muscle does not suppurate is, perhaps, erroneous, from what has been above adduced. That fascia and fibrous tissue in general is little disposed to suppurate, unless when mechanically injured, is manifest from a number of circumstances; and this may, perhaps, be regarded as the true explanation of the fact now noticed. 6. It must further be remarked that inflammation in this tissue renders it thick, hard, and rigid; and occasionally causes between its fibres effusion of lymph, which increases this thickening, induration, and rigidity. On these changes depend the immobility of rheumatic parts, and the loss of power which follows long and obstinate, or neglected and repeated attacks of the disease.

"The question whether there be any thing peculiar in the nature of rheumatic inflammation is not undeserving attention. This, however, is not the place for discussing it; and if the views now advanced be well-founded, it may be inferred that its peculiarities consist in the anatomical and physical qualities of the texture in which I have attempted to shew it is seated.

"Though in acute rheumatism the inflamma-

tion affects a large proportion, if not the whole, of the fascial system, local forms of the disease may occur, in which it is confined, with more or less accuracy, to one or two fasciæ. Thus inflammation of the fascia of the temporal and masseter muscles produces rheumatism of the temple and rheumatic locked jaw; that of the occipito-frontal fascia, rheumatism of the head; that of the cervical fascia, crick in the neck; that of the pectoral fascia and the intersections of the intercostal muscles, spurious pleurisy (*pleurodyne*); that of the abdominal fascia, a rheumatic bellyach; that of the lumbar fascia, *lumbago*; and that of the aponeurotic parts of the gluteal muscles, genuine *sciatica* or hip-gout.*

Inflammation of cartilage, which is generally of a chronic character, may take place as a primary disease; but it more generally succeeds to synovial inflammation. It is characterised by redness, spongy swelling, softness, and finally ulceration or erosion of its structure. Erosion, which in cartilage is analogous to caries in bone, consists first in minute perforations, which extend in number and depth, and, by their coalescence, form patches of an irregular size and shape. When the erosion extends in depth, the epiphysis of the bone is exposed, excavations form, and sometimes the cartilage is entirely removed. The joint is thus destroyed, unless, as in some cases, *ankylosis* take place.

We have another instance of inflammation and ulceration of cartilage in the larynx, in which the inflammation may either take place primarily, or it may spread from the mucous membrane of the throat to the perichondrium or investing membrane. The disease in these cases is generally chronic, even at its commencement; and, though it may arise from cold, it is more generally to be traced to the effect of a specific poison—the syphilitic or the mercurial. It often succeeds to the development and subsequent disorganization of tubercular formations in the structure of the larynx, giving rise to the disease termed *phthisis laryngea*. Both these differ essentially from the more acute and rapidly fatal forms of laryngitis, which consist in acute inflammation and infiltration of the submucous cellular tissue of the glottis.

Fibro-cartilaginous tissue is regarded as intermediate between the fibrous and cartilaginous, possessing the flexibility and elasticity of the former, with the toughness and resistance of the latter. The intervertebral substance of the vertebræ, the semilunar cartilages of the knee-joints, and the cartilages which unite the pelvic bones, are composed of this tissue. These parts are liable to inflammation, which may either originate in their own substance, but more generally in the surrounding structure, or in the synovial membrane with which they are in most instances invested. The inflammation in fibro-cartilaginous tissue produces swelling and softening, which frequently terminates in erosion, as we occasionally ob-

serve after inflammation of the semilunar cartilages of the knee-joint and of intervertebral substance.

Mortification may take place in fibrous tissue. When this occurs, its glistening appearance is lost, and changed to an ash-grey colour, while its texture becomes softened and easily torn. It may even become completely dead or sphacelated, as in sloughing of the cornea, or when large portions of the soft parts, or even an entire limb has been removed by idiopathic gangrene: in these cases the fibrous tissue sloughs with the other structures of the mortified limb.

Bone. The structure of bone undergoes the process of inflammation, which is the origin of many of those diseases to which the osseous system is liable. It may arise spontaneously, or from various kinds of injuries. The process by which the extremities of fractured bones are united, and the erosion which takes place when the epiphyses become separated, are examples of the adhesive inflammation of bone. The bony union by which these injuries are repaired is effected by the blood which oozes from the periosteal and medullary arteries, and the subsequent elaboration of coagulable lymph into which new vessels penetrate, so that the lymph becomes an organised substance similar to granulation, and is termed *callus*. Upon this new substance points of bone are deposited by a peculiar and hitherto unexplained action of the nutrient vessels; these points of bone become gradually more numerous, and finally coalesce into larger masses, until the fractured extremities are at length united by solid bone.

Idiopathic inflammation of bone may arise either in the periosteal covering, or in the cancelli, or medullary structure. We have already explained the effects of inflammation of the periosteum in producing those swellings called nodes: when the periosteal inflammation is very acute, it produces not only thickening of the membrane and deposition into the subjacent cellular tissue, but inflammation of the portion of bone with which it is in contact. If the inflammation be not promptly arrested, suppurative inflammation of the periosteum, followed by caries or ulceration of the bone, succeeds, which often penetrates the substance of the bone to a considerable depth.

Another form of osseous inflammation is that arising in the filamentous medullary structure of long bones, producing swelling and effusion into the cancelli, which may terminate either in permanent induration and enlargement of the bone, or in suppuration. When suppurative inflammation thus takes place, the matter is sometimes deposited in the cavity of the bone, and generally proves a source of great constitutional disturbance. In other cases the vitality of the bone is gradually destroyed from within outwards, constituting the disease termed *necrosis* by surgical writers. This may affect either a part or the whole of the shaft of the bone; so that the epiphyses and periosteum, which are seldom affected, only remain. In the progress of the disease

* Op. cit. p. 515.

the dead portions are enclosed in a case of newly-formed bone, and covered with thickened periosteum.

The two diseases termed *caries* and *necrosis* afford an illustration of ulceration and gangrene of bone. In necrosis, however, reparation is effected by the formation of a new envelopment around the mortified or dead bone. In superficial gangrene of the long bones, such reparation is not observed; these latter cases, therefore, have a greater affinity to gangrene of soft parts.

Inflammation of the medullary texture of the epiphyses, and of the short or cuboid bones, such as the vertebral, tarsal, carpal, and digital, is the cause of the disease described by surgical writers under the term *spina ventosa*.

Dr. Craigie states that the cancellated arrangement of the osseous matter and of its medullary web in these bones, explains the progress and phenomena of the disorder. That this is the seat of its action is to be inferred, first, from the phenomena of the disease; and, secondly, from its effects as seen in diseased bones. *Spina ventosa* never occurs in a bone with distinct medullary canal, unless at the epiphyses, where the structure is cancellated. When it takes place in these situations, it first induces an enlargement of the epiphyses, with extreme deep-seated pain in the bone. Soon after the periosteum becomes thick and swelled; and in no long time sanious matter is found beneath it issuing from the cancelli, which are then softened, partially destroyed, and excavated. If in this state such a bone be examined, the broken cancelli are filled with a reddish, soft, spongy, vascular mass, producing flabby granulations *passim*, and secreting bloody sanious fluid. The compact shell is partly destroyed by irregular ulceration, and partly extruded by the distending force of the swelled medullary web. The diseased epiphysis then presents a large irregular anfractuous cavern, filled with soft spongy substance, which is either the web itself, or the new products which its inflammation has generated. In this manner it is frequent in the upper end of the tibia or the lower end of the femur, or in the extremities of the radius or ulna. (*Op. cit.*)

The effects of inflammation in the different tissues having been briefly considered, it is necessary to shew the changes induced by inflammation in organs which are composed of several tissues (*complex tissues*). The structure of the lungs is, of all the organs in the body, the most complex: it consists of arteries, veins, absorbents, nerves, and the ramifications of the bronchial tubes, lined with mucous membrane, and terminating in very small round cells; all these component parts being firmly united by cellular tissue. It is necessary to be able to distinguish congestion from inflammation of the pulmonary substance, as there is certainly no organ in the body so frequently the seat of congestion. We find very generally, on examining the lungs, even when the person dies in an exhausted state, as in continued fever for example, that the most depending portions are in a state

of congestion. This is owing to the blood gravitating from the position of the body after death. This appearance, though often mistaken for the effect of inflammation, is a pseudo-morbid appearance. It is frequently found in cases where there has been a severe and protracted struggle previous to dissolution, or where there has been a mechanical obstruction to the circulation produced by some organic disease of the heart.

The anatomical characters of inflammation of the substance of the lungs (*pneumonia*) differ according to its stage or degree. Laennec has described three stages, which he considers may be easily recognized; these he has distinguished by the terms *obstruction* (*engouement*), *hepatization*, and *purulent infiltration*, all of which present different anatomical characters.

In the first degree (*engouement*, or *obstruction*) the portion of inflamed lung is externally of a livid or violet colour, which is not removed by immersion in water, or even injecting water into the pulmonary vessels, and more heavy and dense than natural. When pressed between the fingers it is still crepitous, though less so than in its sound state, retaining the impression of the finger like an œdematous limb. It is necessary, however, to bear in mind that lungs which possess naturally a considerable degree of density have proportionally less crepitation. This density of the pulmonary tissue is more remarkable in children. When cut into, the structure is of a dark red colour, the tissue being filled with a serous fluid, more or less tinged with blood; but though evidently injected, the natural soft spongy texture is unaltered, and still permeable to air.

In a more advanced stage of pulmonary inflammation, the smaller bronchia, air-cells, and connecting cellular membrane, become swollen, so that the quantity of air in the inflamed portion of lung is diminished and supplied by blood. This constitutes the second degree of pneumonia (*hepatization*). It is characterized by a deep red colour of the inflamed portion of the lung, varying in different points from that of violet grey to blood red, and by the greater density and consistence of the granulated texture exhibited in its section, giving it somewhat the appearance of liver, from which the term hepatization has been derived. The hepatized portion of lung has lost its crepitous feel, is impermeable to the air, and sinks in water, and when divided, no air escapes, but a small quantity of bloody serum, mixed with a thick opaque fluid, may be expressed. When the minute structure is examined closely, the natural pulmonary texture has lost its cellular appearance, and appears to be composed of a number of small red grains, oblong and flattened, which, according to Laennec, are the air-cells transformed into solid grains by the thickening of their parietes, and the obliteration of their cavities by a concrete fluid. Andral, however, states that this granular appearance is often altogether wanting, so that its surface, when cut into, appears smooth and compact. He supposes the granular appearance to depend on the degree of tumefaction which the air-cells un-

dergo; for when the tumefaction passes a certain limit, its effect is to approximate the cells so closely that they become confounded together, and the granular appearance vanishes entirely.

The extent of pulmonary substance occupied by these two degrees of inflammation is various. Sometimes the inflammation extends over an entire lobe, (*pneumonia lobaris*): in other instances it is confined to one or more lobules (*pneumonia lobularis*): in some cases it affects only the air-cells (*pneumonia vesicularis*): some writers indeed consider that in pneumonia the inflammation commences in the air-cells, from which it is propagated to the parenchymatous tissue.

When pulmonary inflammation has advanced to the formation of pus, this fluid is found either in the form of purulent infiltration, or collected into an abscess. Purulent infiltration is by far the more common appearance; this succeeds to the most intense degree of pulmonary inflammation, and often takes place with great rapidity. According to Andral it has formed within four days after the first symptoms of pneumonia had made their appearance. The portion of lung in which the purulent infiltration has taken place presents an ash-grey colour, from which it has been termed *grey hepatization*, to distinguish it from the second stage of pneumonia, the *red hepatization*. If the pus be squeezed from the pulmonary texture, it assumes the colour of the red hepatization, but it is much softened and consequently easily lacerated. The grey colour is evidently owing to the admixture of pus with the red tissue of the inflamed lung.

These three stages of pulmonary inflammation may be often seen in different portions of the same lung; sometimes an entire lung is infiltrated with pus, while the other presents different stages of pneumonia; some portions being in a state of red, others of grey hepatization, the one stage passing by insensible degrees into the other.

With regard to the portion of lung most frequently affected with pneumonia, it appears from the statements of Laennec, Andral, and others, that it occurs most generally in the lower portions, though it is not uncommon to meet with a circumscribed portion of the centre of the lung inflamed, the surrounding parenchyma being quite sound.

It is a singular circumstance, also, that the left lung should be much more frequently the seat of pneumonia, and, indeed, of almost every lesion, than the right. Of two hundred and four cases of evident pneumonia, the right lung was affected in one hundred and twenty-one instances, the left lung in fifty-eight, and both lungs in twenty-five.*

Abscess of the lung has been very rarely met with, though cases succeeding to pneumonia are recorded by several writers. In these instances the boundary of the excavation in the lung, which is filled with pus, is formed by the pulmonary tissue.

Another and perhaps more frequent form

of pulmonary abscess is that in which pus is deposited in the lung, not as the consequence of inflammation, but from this fluid, formed in some other part, being conveyed through the medium of the circulation, and deposited in the lung. There are many striking instances of these purulent deposits succeeding to important operations, and to purulent collections in other organs of the body, which, after an attentive examination, Andral proposes to range in two classes. In one, it appears that the pus is formed in the torrent of the circulation, or is introduced into it from some organ in a state of suppuration, and in its passage through the tissue of the lung is separated as through a filter, and either collected into an abscess, or infiltrates the pulmonary tissue. It is probably by a similar process that mercury injected into the crural vein of a dog traverses the whole circulating system until it arrives at the lung, where it abandons the circulating fluid. In the other class of cases, some cause with which we are unacquainted alters the blood, coagulates it in the pulmonary vessels, and transforms it into purulent matter in the smaller branches of these vessels.*

The termination of inflammation of the lungs in gangrene is exceedingly rare, and when it is met with, it is not always to be regarded as an indication of the intensity of the pneumonia, as it has been found in cases when the symptoms, as well as the appearances of inflammation, were very slight and equivocal. Laennec regards it as very similar to idiopathic gangrene, such as anthrax, pestilential bubo, and malignant pustule. Andral, on the other hand, asserts that gangrene of the lung, as well as of other parts of the body, may succeed to every species of hyperæmia, whether mechanical or vital, provided it be so considerable as to impede or prevent the afflux of arterial blood to the part.

Gangrene of the lung occurs under two forms—the *circumscribed*—and the *uncircumscribed*; the one differing from the other only in extent.

Circumscribed pulmonary gangrene occurs in a small portion of the lungs only; the mortified part is separated by a suppurative process which is established around it, and the eschar or slough is expelled with the expectoration through perforation of one or more of the bronchial tubes. An ulcerous excavation discharging a dirty fluid remains, which, by mixing with the expectoration, gives it a most offensive odour. When the gangrene occurs near the surface of the lung, it produces erosion of the pleura, which is succeeded by pleurisy and pneumothorax.

Uncircumscribed pulmonary gangrene is much less common than the circumscribed. Laennec had only seen two cases of it during twenty-four years, and he had only known of five or six cases of it in the hospitals at Paris during the same period. He gives the following characters of this lesion, which may occupy a great portion of one lobe, or occasionally

* Andral, Clin. Med. tom. ii.

* Anat. Patholog. tom. ii.

the greatest part of one lung. The pulmonary tissue, more humid and less cohesive than in the sound state, has the same degree of density as in the first state of peripneumony, œdema of the lungs, or the serous engorgement occurring after death; its colour varies from a dirty white or slightly greenish hue, to a deep green, approaching to black, with a mixture, occasionally, of brown, or of earthy or yellowish brown. In some places the pulmonary substance, altogether or nearly sound, blends insensibly with the gangrenous part; in other instances, these are separated by a portion of lung inflamed in the first degree, and in still rarer instances by pulmonary hepatization.

Spleen. The spleen consists of few anatomical elements—first, a fibrous investing membrane, constituting its proper capsule of the organ; secondly, an internal cellular arrangement into which the blood is poured; thirdly, bloodvessels, lymphatics, and nerves. As the parenchyma of this organ, therefore, consists of two component ingredients only, fibrous tissue and blood, its diseases must be referable to one or other of these. Andral thinks its diseases ought to be the same as those of the veins, for it is evidently a vast venous network, in which the cellular is substituted for the vascular form. He therefore considers the lesions of the spleen to be of two kinds; those of the first, which are rare and unimportant, have their seat in the capsule, or in its fibrous prolongations, which constitute the walls of the splenic cells; those of the second, of much greater frequency and importance, originate in some of the elements of the blood.

The capsule of the spleen is liable to the diseases of fibrous tissue, and consequently to inflammation, though such instances are rare. Abercrombie has seen the spleen completely enveloped in a thick dense covering of false membrane, in connection with peritonitis, but without any disease of its substance. In such cases, however, the lymph was probably effused from the inflamed peritoneum, and not by the capsule of the spleen. This membrane has also been found adherent to the contiguous viscera in cases of purulent infiltration, when the pus is making its way towards the surface of the spleen, and if the organ to which it becomes attached be hollow, (as the stomach or alimentary canal,) the matter is discharged into it. The capsule of the spleen has been found in many of those instances soft, pulpy, and lacerable.

Cases of purulent formations in the spleen are not very common, more especially those in which pus is found in no other organ. It is improbable that such instances originate in inflammation of its parenchyma, since we have seen that its structure is such that it may be said to be almost insusceptible of inflammatory action, unless the blood be presumed to be susceptible of inflammation. Whence, therefore, originates the pus? This is a question of rather difficult solution, though Andral thinks from some experiments it would seem probable that the blood in the spleen may be converted into pus; and that the disturbance in the system

which has been observed to accompany this lesion, is to be regarded as the result of the conversion of the blood into purulent matter.

A more frequent form of purulent formation in the spleen is when this organ becomes infiltrated with pus, at the same time that similar purulent deposits take place in other organs. In these cases it is supposed that the pus is formed in some distant organ, and after being carried in the blood, is deposited in the spleen and other organs at the same time. In such examples, the primary disease has sometimes occurred in connexion with diseases of the uterus, or of the uterine veins; as in a case recorded in the Transactions of the College of Physicians,* and in another alluded to by Andral:† in other instances, the purulent depositions have succeeded to external injuries and severe surgical operations. The pus may be collected in drops, or in cavities of greater or less extent; it is sometimes confined in a cyst of false membrane, but more frequently the wall of the abscess is formed by the structure of the spleen, in which case the abscess is often of very considerable extent.

The termination of such cases is various: the abscess may, by adhesive inflammation and the subsequent process of ulcerative absorption, burst into the cavity of the chest, belly, stomach, or intestines, or it may be discharged through the kidneys by the urine. Splenic abscesses have been known also to open externally through the walls of the abdomen, the back, or the loins (*Andral*).

Though the thyroid gland is occasionally inflamed, it seems to be as little susceptible of inflammation as any gland in the body. When inflamed, its vessels are numerous and injected, so that its tissue is red and swollen, and feels much firmer than in its natural state; these changes being produced partly by serous infiltration, or when the inflammation is more intense, by the effusion of coagulable lymph or blood into its structure.

From the rare occurrence of inflammation of this gland, its pathological appearances consequent to inflammation, have been scarcely noticed in the writings of pathologists.

Inflammation of glandular organs of secretion. Without entering into the disputes of anatomists, as to the form and texture which are necessary to constitute glandular structure, we shall merely state, that the most perfect glands are the lachrymal, salivary, submaxillary, sublingual, mammary, and prostate—the pancreas and testicle (*colourless glands*), and the liver and kidneys (*coloured glands*). Their external form is generally round or ovoid, and most of them consist of small lobules, connected by cellular tissue. For their size they are the most vascular parts of the body, a large supply of blood being necessary for the purpose of elaborating the various fluids secreted by glands.

When a glandular organ is inflamed, it increases in size, and its excretory ducts become enlarged and distended: the tissue of the colourless glands is of a slight rose tint: in the

* Vol. v. p. 304.

† Anat. Path.

coloured, the natural redness becomes deeper, the injection extending throughout the interlobular cellular membrane. The excretory ducts are filled with fluid which is generally limpid, unless the inflammation be intense, when it becomes red, and even bloody. These anatomical appearances, however, pass off very rapidly after death.

Inflammation of a gland generally terminates in resolution; but if, from its intensity or improper treatment, it proceed to suppuration, the purulent matter forms in the cellular tissue of which the gland is partly composed, the proper substance of glands being not very susceptible of the suppurative process. When, however, the inflammatory action is very intense, it undergoes a species of suppuration; it loses its consistence, and to the softening succeeds infiltration with a thin kind of pus, the sensible qualities of which depend very much on the state of health and particular constitution of the individual.

When suppuration takes place in glands which have large secreting ducts, as the liver and kidneys, the mucous membrane with which these canals are lined sometimes assumes the suppurative action; hence, when pus is mixed with the fluid which the gland secretes, (the bile or urine for example,) it may be secreted either by the inflamed mucous lining of the duct, or there may be a communication between an abscess in the organ and the duct through which the matter is discharged.

These general observations being sufficient to give an idea of the effects of inflammation in glandular organs, we shall, without noticing specially the external glands, make a few remarks on inflammation of the internal organs of secretion—the *pancreas*, *liver*, and *kidney*.

1. The *pancreas* appears to be seldom the subject of inflammation and its consequences; in those cases which have been reported as instances of inflammation of this organ, the symptoms during life were not only very obscure, but the anatomical characters of the lesion not well defined.

In the cases which are reported, redness, more or less deep, and loss of consistence of the substance of this organ, with injection and infiltration of the interlobular cellular membrane, are the morbid appearances described. The inflammation does not appear to have extended through the whole structure of the gland, but limited to one portion of it.

When inflammation of the pancreas has terminated in suppuration, the small lobules of which the pancreas is composed assume a grey-red colour, and become soft, and finally so completely disorganized, as to lose all trace of their original structure. The purulent matter is in some cases diffused through the cellular substance; in other instances the pus is confined in a distinct cavity or cyst, the abscess sometimes forming a tumour of considerable size adhering to the surrounding viscera. Sometimes, again, the pancreas has been found hard and shrivelled in the centre of the purulent deposit. These pancreatic abscesses have been known to make their way across the cellular tissue of the

mesocolon, and, by perforating this membrane, the purulent matter has escaped into the cavity of the abdomen.

2. Congestion of blood may take place in the parenchyma of the *liver*, from causes originating in the organ itself, or as the effect of sympathetic disturbance in some other part. Again, when there is any obstacle to the free return of blood to the right side of the heart, the blood accumulates in the liver, and thus passive hepatic obstruction or congestion is induced. When this takes place, the liver is of a uniform red colour, a little increased in bulk, and evidently changed in density or consistence. Under the pressure of congestion the bloodvessels sometimes give way, and the blood is diffused through its parenchyma, constituting what the French writers term *hepatic apoplexy*. This lesion may be the result of rupture of one or two of the larger hepatic vessels, or of exudation from the capillaries.

Inflammation of the liver is more common in warm than in temperate climates; and notwithstanding the frequency of its occurrence, its anatomical characters are not very distinctly laid down, which may arise from hepatitis being very rarely fatal in the inflammatory stage, so that few opportunities of ascertaining the morbid appearances occur. The appearances in inflammation of the liver differ according to its intensity, duration, and extent. Though inflammation may occur either in the serous covering, or in its parenchyma, it appears to be much more frequent in the latter. Indeed, from the history of hepatitis, given by writers who have had extensive opportunities of observing the disease in hot climates, we are informed that inflammation of the capsule of the liver is of comparatively rare occurrence.

In the milder forms of hepatic inflammation the organ is slightly increased in size and density, and of a dark-red colour, from accumulation of blood, which flows freely where an incision is made. These changes are more evident when the inflammation is circumscribed or partial, as the morbid may be then contrasted with the healthy structure. In the more advanced stage, or when the inflammation has been from the beginning more intense, the parenchyma is more or less softened, and very vascular, the vena portæ, mesenteric vessels, and mucous membrane of the duodenum, being gorged with blood.

The degree to which this hepatic softening occurs depends on the degree and duration of the inflammation. In the more intense cases, the tissue of the liver occupied by the inflammation is reduced to a soft lacerable pulp of a deep violet or brown colour.

When hepatic inflammation terminates in suppuration, the pus may be diffused through the parenchyma of the liver, so as to give it a green-yellow colour, the tissue in which it is infiltrated, and for some extent around, being softened and disorganized. In other instances the pus is confined in abscesses, varying in size, sometimes distinct from each other, but

occasionally communicating by perforations. These abscesses may be bounded by the parenchyma of the liver only, or by a more or less completely organized cyst; they often acquire a very large size, in some instances containing several pints of pus.

The termination of abscess of the liver is various;—1. it may be discharged through an opening in the hypochondrium, or some other situation: 2. when adhesion between the hepatic abscess and some portion of the alimentary canal or kidney takes place, the pus may be discharged by the stomach, bowels, or kidney: 3. the abscess may burst into the cavity of the abdomen: 4. it may perforate the diaphragm and be discharged into the cavity of the chest or pericardium; or if an adhesion form between the hepatic abscess and the lung, the pus may be discharged through a perforation in the bronchial tubes by expectoration. Andral alludes to a case of hepatic abscess situated near the gall-bladder, emptying itself into it, and passing from thence into the biliary duct; and also to a case in which abscess of the liver communicated with the vena cava.

Gangrene of the liver, if it do really occur, must be regarded as an extremely rare termination of hepatitis, as no unequivocal instance of this lesion has been recorded. Mr. Annesley, whose extensive opportunities of observation entitle him to be regarded as an authority, states that he never observed it as a termination of hepatitis of warm climates.

3. Inflammation of the *kidneys* is characterised by obscure redness of the *tubular*, and bright-red colour of the *cortical* substance, the tissue of the former acquiring a degree of firmness, the latter becoming softened, and easily torn.

The emulgent vessels are generally turgid, and the inner membrane of the pelvis and infundibula red and injected, the redness often extending along the membrane of the ureters.

In more intense renal inflammation the tissue of the kidney becomes of a deep red or chocolate colour, and remarkably softened.

Inflammation of the kidney may terminate in resolution, softening, and induration of its parenchyma, or in the formation of pus. Purulent formations in the kidney may take place in three different modes. 1. The inflammation may commence in and be confined to the tubular or secreting portion, and pass into supuration, in which case the uniferous tubes, infundibula, and pelvis of the kidney, secrete purulent matter, which is discharged with the urine. In these cases the kidney is not enlarged in size, and the signs of inflammation are confined to the secreting part of the organ. 2. The pus may be infiltrated through the tissue of the kidney, accompanied with deep-red colour and softening of its substance; a number of white spots, frequently mixed with blood, are seen, from which pus may be squeezed; they are often mistaken for masses of tubercle. This form may be the result of inflammation, or of general purulent diathesis, when pus is found in other organs. 3. The purulent matter may be collected in distinct abscesses. These may

be of small extent, the surrounding parenchyma being scarcely altered; or the whole tissue of the organ may be transformed into a purulent sac, which, according to Andral, is generally multilocular, the septa consisting of hard lardaceous tissue. They may exceed in bulk the kidney itself, and thus produce a tumour distinguishable through the abdominal parietes.

The inflammation in some cases commences in the renal capsule, to which it may be limited, or it may extend to the adjacent portion of the kidney. In these cases suppuration generally follows, but the abscess is exterior to, and unconnected with the substance of the kidney, the structure of which is unaltered, though often, from the pressure of the abscess, diminished in bulk. Abscesses sometimes form in the abundant loose cellular tissue which lies beneath the peritoneum, and surrounds the kidney and its proper capsule. Morgagni gives a case of this kind, which contained four pounds of purulent matter.

Renal abscesses may be discharged in various ways:—1. the pus may pass off with urine; 2. it may burst into the abdominal cavity and produce peritonitis, which is speedily mortal; 3. the abscess may form an adhesion and open into the colon; 4. it may be discharged externally by a perforation in the loins.

Gendrin has quoted a case from Ledran, in which a renal abscess opened at the loins, and the matter having forced its way in the sub-peritoneal cellular tissue down under Poupart's ligament and around the crural vessels, was also discharged at the inner part of the thigh. He alludes also to that case related by De Haen, in which an abscess in the left kidney, after destroying the substance of the organ, formed an adhesion to the diaphragm, which it perforated, and destroyed the inferior lobe of the left lung, the kidney and lung thus forming one large sac.

Causes of inflammation. There are few circumstances connected with pathology more obscure and unsatisfactory than the etiology of diseases. This is fully exemplified in the obscurity in which the origin of almost every form of inflammatory disorder is involved. Many, indeed, arise without evident cause, constituting what has been denominated by practical writers spontaneous inflammation—a term which simply denotes that the causes are so obscure as to elude observation.

It would appear, however, that certain circumstances predispose the system or render it more liable to inflammation; this predisposition may exist either in the system in general, or it may be confined to a particular region, organ, or tissue.

The *predisposing* causes may be arranged in two classes, the first depending on general sanguineous plethora; the second are connected with local determination of blood. Practical writers have usually mentioned the sanguine temperament among the individual causes which predispose to inflammation. Persons who possess this temperament are generally supposed to have a superabundant quantity of blood, whereby the vessels, more especially the

capillaries, are kept in a state of undue distention, the blood having at the same time great consistency or richness. It is also asserted that adults, especially male adults and those possessing what is called a strong constitution, are more predisposed to inflammatory diseases. It has always appeared to us, however, that these views are not supported by facts and observation, and in our own experience, we have generally found that weak and delicate persons are much more frequently attacked with inflammation than the more robust and vigorous. Not less unsupported by evidence is the notion entertained by Van Swieten, that serous evacuations, such as profuse sweating, salivation, or copious flow of urine, predispose the body to inflammation, in consequence of the blood acquiring greater consistency from the abstraction of its watery principles. A predisposition to inflammation, or tendency to particular local determinations of blood, is observed at certain periods of life. We accordingly find that there is a greater tendency to cerebral fulness in infancy and childhood than at other ages; towards puberty, we observe fulness of the pulmonary system, which accounts for the frequency of nasal and pulmonary hemorrhage at this period. In adults, on the other hand, diseases of the abdominal viscera connected with vascular fulness are more common, though it should be kept in mind that congestions or irregular distributions of blood are more common than organic inflammation. It is often of great consequence to discover those circumstances which give a predisposition to inflammation in particular organs and tissues. These may often be traced to a state of partial or local plethora, connected with causes which are inherent in the part itself, though a predisposition to local inflammation is frequently acquired. Thus the undue exercise of an organ frequently predisposes it to inflammation, an illustration of which is the tendency to ophthalmia or retinitis induced by long-continued use of the eye, or straining this organ in examining very minute objects; in the effect of long-continued application to study in producing slow, insidious, cerebral fulness; in the effect of long-continued exposure to cold in laying the foundation of pulmonary diseases; and in the tendency to hepatic inflammation engendered by residence in a warm climate.

It is also a well-known fact that a predisposition to inflammation is given by previous attacks. This is so much a matter of experience and observation that it is scarcely necessary to adduce examples in illustration.

Whatever circumstance or combination of circumstances breaks up the general powers predisposes the body to inflammatory diseases, by rendering it unable to contend against the exciting causes. It is in this way that undue bodily or mental exertion, the depressing passions, long-continued watching, impure air, improper or scanty supply of food, or insufficient clothing, may be regarded as predisposing causes of inflammation.

It is worthy of remark that the predisposing

causes have a considerable influence in determining the type of the subsequent inflammation, as well as the nature and extent of the curative measures. Those inflammatory diseases which arise suddenly, are generally connected with a full habit, and require active treatment; while those which come on more slowly, or in exhausted constitutions, are of the asthenic character, requiring greater circumspection in the nature and extent of antiphlogistic remedies. In such cases we are often obliged to support the general powers, when the local symptoms render the topical and even the general abstraction of blood, among other antiphlogistic measures, expedient.

The exciting causes of inflammation are no less obscure than the predisposing. Many pathologists have expressed their doubts as to the possibility of inflammation ever arising spontaneously. There can be no doubt that in many instances organic inflammation appears without our being able to discover its cause. Thus, inflammation is often set up in the brain, chest, or abdomen, without any evident cause. The inflammation is then termed spontaneous, in contradistinction to accidental inflammations, which are so called from their originating in causes applied immediately to the part affected. It would be unreasonable to say that in such cases the inflammation arose without some cause, though it may not be possible to detect it.

There has been too great disposition, on the part of systematic writers, to take for granted the ordinary list of exciting causes of inflammation. A little reflection will soon convince the patient observer of nature, that the causes of disease are more mysterious than we are led to suppose from perusing systematic treatises. If the etiology of diseases were studied at the bedside, the obscurity of this department of medicine would be apparent; and it has been constantly observed that most idiopathic inflammations are developed by causes which elude our observation.

The effect of atmospheric causes on diseases in general has attracted the notice of physicians from very early ages. Inflammatory disorders are certainly more common in cold, variable, moist weather, and more especially when the wind blows from the north; hence, in the winter and spring, we observe the various types of inflammatory diseases. The mucous membranes seem to suffer more particularly in cold moist weather, and the serous membranes and parenchyma of organs in cold dry weather; while in summer cutaneous inflammations (idiopathic or secondary) are observed to be most frequent.

Inflammation may arise from injuries of various kinds, such as wounds, whether punctured, incised, lacerated, or contused; from the irritation of foreign bodies, such as renal, biliary, gouty, and salivary concretions; and from pressure, as in the instance of a bandage or ligature applied to the extremity; or in the example of pressure produced on an internal part by aneurismal or other kinds of tumours,

whether solid or fluid, the pressure of which causes inflammation in the parts to which it is applied.

Another exciting cause of inflammation is the direct application of heat. This is exemplified in the effect of exposure to the rays of the sun in producing inflammation of the brain or external integuments of the head and face, and in the effect of heat in producing scalds and burns.

The effects of cold, as an exciting cause of inflammation, more especially if combined with moisture, are well known. We observe inflammation occur in parts to which the external air has free access—the eye—the ear—the tonsils—the larynx or trachea, and the mucous membrane of the lungs, after exposure to cold. These are instances of the effects of the direct application of cold. At other times the application of cold is followed by inflammation of a distant organ, an indirect effect being sometimes thus produced on an internal part, by the local application of cold and moisture. Thus a person who gets the feet thoroughly wet may afterwards have inflammation of the throat, of the lungs, or intestines, according to some local but still unexplained predisposition. We have another exemplification of the effect of cold in producing inflammation in frost-bite, in which very often rapid destructive inflammation is set up from the application of intense cold.

Undue exercise of the functions of an organ may become not only a predisposing, but an exciting cause of inflammation. In this way undue exercise of the mental powers is a frequent cause of inflammation of the brain. In like manner, also, inflammation may be produced in the eye, as is frequently observed in persons who are obliged to use this organ unduly in their daily avocations. Inflammation of the vocal organs is a common consequence of long-continued loud speaking; hence noisy maniacs frequently become hoarse from the constant vociferation in which they indulge.

Some substances, when taken into the stomach as remedies in disease, produce inflammation of particular parts. We have an example of this in the inflammation of the salivary glands, and sometimes of the skin, produced by the exhibition of mercury, or in the gastro-intestinal inflammation which is the result of the employment of arsenic as a remedy in some diseases, but more especially when it is taken in such quantity as to act as a poison. To the same head of causes of inflammation, we may refer the various examples of local irritation and its consequences arising from irritant poisons. According to Dr. Christison, these effects of local irritation vary from the slightest redness to ulceration and even gangrene. Thus externally, alcohol reddens the skin; cantharides irritates the surface of the true skin, and causes vesication; tartar emetic causes deep-seated inflammation of the true skin and a pustular eruption; the juice of manchineel, spreading inflammation of the subcutaneous cellular tissue; arsenic has all of these effects, as also

death of the part and subsequent sloughing. Internally, alcohol reddens the stomach as it does the skin, but more permanently; while other substances, such as the diluted mineral acids, nitre, arsenic, cantharides, euphorbium, and the like, may cause all the phenomena of inflammation in the stomach and intestines, namely, extravasation of blood, effusion of lymph, ulcers, and gangrene.*

There are other substances belonging to the class of irritants—the acro-narcotic poisons—which have a compound action, the one local and irritating, the other remote, producing an impression on the nervous system. To this class belong the atropa belladonna (deadly nightshade), the datura stramonium (thorn-apple), and the nicotiana tabacum (tobacco).

The morbid animal poisons, as exciting causes of inflammation, belong also to this head. Some of these have a local action only, as the poison of itch or syphilis: more generally, however, the poison, though introduced locally, affects the general system, as in the instance of small-pox and cow-pox, and the poison of hydrophobia. It would appear, moreover, that some animal poisons operate through the medium of the blood. It is probably in this way that measles, scarlet fever, plague, the natural or uninoculated small-pox, and some other acute disorders, are produced. Many of these diseases, as is well known, give rise in their progress to various local inflammations, the danger to life depending in a great measure on the severity of these local lesions.

Terminations or effects of inflammation. The mode in which inflammation terminates depends on several circumstances, more especially the nature of the exciting cause, the intensity and duration of the symptoms, the peculiar constitution of the individual, the curative measures adopted, and the stage of the disease at which they have been employed.

1. *Resolution.* Inflammation may gradually subside by the unassisted efforts of the system, constituting spontaneous resolution; or its progress may be arrested by the employment of remedies before it has effected any change of structure in the part. Resolution is not only the most favourable, but the most common termination of inflammation: it is indicated by the progressive abatement of the local as well as general symptoms, and especially by the restoration of the natural functions of the part. When resolution takes place suddenly, the French writers apply the term *delitescence* (from the verb *delitescere*), implying sudden disappearance; this is exemplified when a primary inflammation suddenly disappears and attacks another organ. This sudden decline of the inflammatory action is less frequently observed, however, than the more slow and gradual process of resolution.

The resolution of inflammation is often preceded or accompanied by *metastasis*, or translation of the disease from one part to another. We have an instance of this in the common

* Christison on Poisons, second edit.

occurrence of inflammation suddenly leaving one tonsil and seizing on the other, in the sudden recession of the glandular inflammation in numps, and the subsequent inflammation of the testicle in the male, or the mamma in the female. In gouty and rheumatic inflammation, such sudden translation is frequently observed. The articular inflammation in gout sometimes recedes from the foot, and appears in the hand or knee, and occasionally attacks some internal organ, the stomach or brain. The sudden recession of rheumatism from joint to joint is a still more common occurrence, and is the cause of the generally protracted nature of this disease. A still more dangerous effect of the recession of rheumatic inflammation is, when it leaves the joints and fixes on the membranes of the brain or the serous covering of the heart.

Physicians, from observing the complete cessation of inflammation, when a secondary disease is produced, have endeavoured to imitate nature, and by means of derivation or counter-irritation applied in the vicinity of an inflamed organ, to establish an external disease, in the hope of withdrawing the inflammation from an internal to the external and less important part: these measures now form an important part of the local treatment of inflammation. (See COUNTER-IRRITATION AND DERIVATION.)

When inflammation is about to terminate in resolution, various changes take place according to the stage and intensity of the inflammatory action, and the structure of the inflamed part. In the slighter grades of the disease, the frequency of the circulation diminishes, the blood-vessels contract in their diameter, so that those, which during inflammation were so much dilated as to admit the red particles of the blood, again receive only a colourless fluid. When the inflammatory action has been more severe, the resolution is accompanied, if not effected, by an increase of the natural secretion of the part. If the inflammation occur in a serous membrane, the exhalents secrete an undue quantity of serum, or even coagulable lymph, which goes on so long as the inflammatory action continues; but whenever resolution takes place, the further progress of effusion is not only arrested, but the fluid already thrown out is gradually removed by absorption. When inflammation occurs in a mucous membrane, the natural secretion, though at first diminished, is afterwards increased, and more or less altered in its quality, more particularly if the inflammation have passed into the chronic stage.

Thus we find in bronchitis and muco-enteritis, that though in the primary stage of inflammation of these membranes the natural secretion is suppressed, as the diseased action proceeds, the natural secretion is first restored, and afterwards increased in quantity, and finally altered in quality. The error of attempting to check the secretion from an inflamed mucous membrane, especially in the early stage of the disease, the increased discharge being the natural solution of the diseased action, is, therefore, obvious. Besides these local circumstances which are observed

when inflammation terminates in resolution, we find occasionally other changes take place, which from their supposed influence in effecting this desirable solution, have been considered critical. There is sometimes an increase of the perspiration, or moderate diarrhoea, but more generally the urine exhibits marked alteration in its physical and chemical characters. While the inflammatory action is proceeding, the urine, though high-coloured, is clear, and does not, on cooling, deposit a sediment, but when the inflammation is disappearing, it deposits, on cooling, a red sediment. The following ingenious explanation of this appearance of the urine is given on the authority of Dr. Prout.

In healthy urine there is lithate of ammonia, which is pale and white, as also a yellow colouring matter, the nature of which is unknown, but which is thought to be, perhaps, a modification of lithic acid. If to lithate of ammonia out of the body what are called the *purpurates* be added, a pink substance is immediately produced, such as is observed in hectic fever; and if the urine have its usual yellow colouring matter, a mixture of that with the pink appearance produced by the purpurates and the lithate of ammonia gives a red colour, pink and yellow mixed together, forming a red colour. In this diseased state we are informed by chemists that nitric acid in excess is formed in the urine, which acts on the lithic acid, and converts some of it into a new acid called the *purpuric*, which, uniting with the salts of the urine, forms the purpurates; and these purpurates, mixing with the lithate of ammonia, which is always in the urine, produce a pink deposit, which, united with the yellow colouring matter, becomes red. The lithate of ammonia and soda are formed in some degree of excess in the urine under inflammation, and nitric acid is produced; which, as has been stated, acting on the lithic acid, produces purpuric acid; and thus the formation of the purpurates is explained. Those mixing with lithate of ammonia produce a pink substance; and when this unites with the yellow colouring matter, the colour is changed to red. The cause of the urine being high-coloured or red, without sediment, till the inflammation declines, is this, that the same substances are in the urine, but held in solution by the activity of the complaint; but when it declines, an excess of lithic acid is formed, producing *super-lithates*, which are very insoluble; and, therefore, a great portion of them falls down in the form of a precipitate; hence the red sediment.*

The resolution of inflammation is sometimes accompanied by hemorrhage, with which inflammatory action is often intimately connected. Critical hemorrhages may take place either immediately from the inflamed part or from some neighbouring organ. We have an instance of the one, in the hemorrhage which succeeds to inflammation of mucous membranes, and of the other, of epistaxis in apoplectic or inflammatory states of the brain.

* Elliotson's Lectures on Inflammation.

These spontaneous hemorrhages are always followed by most marked relief of the local and general symptoms.

When inflammation does not terminate in resolution, it effects other morbid changes in the inflamed tissue. The terminations, or, more properly speaking, the effects to which we allude, are *Effusion, Suppuration, Mortification, Ulceration, Induration, Softening, and Hemorrhage.*

2. *Effusion.* The exemplification of effusion as a consequence of inflammation is best illustrated in the serous membranes. After the violence of the inflammatory action has subsided, and the natural secretion of the membrane, which, during the primary stage of inflammation, had been suspended, is restored, an increased effusion of serosity takes place. The fluid which in these cases is secreted, and which happens only when the inflammation is moderate, bears so strong an analogy, both in its physical and chemical characters, to the serum of the blood, as to have received the appellation of serosity or serous fluid. It is generally of a pale straw-colour and transparent, though occasionally, when the inflammation is a little more intense, it contains a small proportion of albumen, which renders it slightly turbid. When the inflammatory action has been more violent, the fibrinous principle of the blood is separated; the admixture of which with albumen and serum constitutes coagulable lymph. It is this product which, when mixed with serous fluids, renders them turbid; the flakes of coagulable lymph, from their greater specific gravity, generally falling to the bottom of the cavity in which the effusion takes place, lining at the same time the surface of the inflamed membrane, and constituting that product termed *false membrane.*

When an intense inflammation has lasted several days, the fluid acquires a yellow colour from admixture of purulent matter: when this is considerable, the effusion very nearly resembles in appearance well formed pus; but it still contains a large proportion of coagulable lymph and serous fluid.

In the commencement of the formation of false membranes, the exudation is soft and without consistence; but from the thinner parts being gradually absorbed, they become more dense, and adhere to the inflamed membrane, forming webs of various figures, which extend from one point to another of the surface on which they arise. When subjected to pressure, they give out a large proportion of fluid consisting of serum mixed with albumen; the solid substance appearing globular when viewed with the microscope, and, according to the analysis of Davy, consisting chiefly of fibrine.

False membranes often become completely organised, and of a distinctly cellular structure, capable of being injected; and when the inflammatory action ceases, they are converted into cellular tissue covered with a serous membrane, and afterwards liable, like serous tissues, to inflammation.

Fibrine is also sometimes effused from in-

flamed mucous membranes, and gives rise to the formation of false membranes, such as that which is effused in the larynx and trachea, or from the mucous surface of the intestines or uterus. The false membranes formed in mucous cavities, however, are less consistent than those which are effused on serous surfaces, probably owing to their containing less of the fibrinous principle. When an inflamed mucous membrane is about to terminate in the exudation of a false membrane, an unusual quantity of viscid mucus is secreted, which gradually becomes more consistent from the admixture of fibrine which is effused in the subsequent stage of the inflammatory action. These pseudo-membranes, as was stated before, generally bear the mould of the cavities in which they form.

The organization of coagulable lymph gives rise also to the process of *adhesion*—an operation of nature by which surfaces of parts which have been recently divided become re-united, the lymph becoming a living intermedium whereby the continuity of the part is ultimately restored. A knowledge of the fact that parts which have been divided may be again united by adhesive inflammation, has laid the foundation of many of the most important improvements in surgery.

The mode in which divided parts are united, and injuries repaired, termed union by the first intention, is similar to that which takes place in the formation of false membranes. If a surface which has been divided, an incised wound for example, be examined a few hours after the solution of continuity has taken place, it will be found covered with a layer of coagulable lymph. Dr. Thomson made some experiments upon animals with the object of ascertaining the earliest period at which coagulable lymph is effused from the surface of a wound; he observed a distinct layer of lymph covering wounds he had made within less than four hours after they had been inflicted; though he thinks a longer period may be required in the human subject, in different persons, in different textures of the same individual, and in the different states of health and disease. The exudation of the lymph is speedily followed by the formation of bloodvessels, which often become, in the course of a few hours, so large as to be capable of being injected. This is the state of re-union termed by Mr. Hunter *adhesive inflammation.*

In many instances the reparation of an injury or divided surface is effected by a different process—that of *granulation*, termed by the older writers union by the second intention. The process of granulation takes place, when from various circumstances wounds do not unite by adhesive inflammation, or when there has been a considerable loss of substance in a part, as in abscesses, ulceration, and gangrene. In these cases a layer of coagulable lymph is effused on the surface of the wound, which, as in the process of adhesion, becomes penetrated with bloodvessels, and thus a living intermedium is formed. Soon afterwards the surface is covered with purulent matter thrown

out by a peculiar action of the vessels of the part, in which circumstance, besides the non-union of the divided tissue, the granulating differs from the adhesive process. Granulations assume the appearance of small red points and eminences, and according to Dr. Thomson, the mode in which nature effects their formation may be seen by injecting and carefully examining the internal surfaces of abscesses, or the granulating surfaces of healthy sores or ulcers. From numerous observations made in this way, it appears the exudation of a layer of coagulable lymph may be regarded as the first step in the process of granulation. The second consists in the penetration of this lymph with bloodvessels, nerves, and absorbents; the third, in the inosculation, or union by open extremities, of the vessels in these granulations; and in the last step, if it may be called so, of their formation, the granulations are covered over with cuticular substance by which the further secretion of pus is prevented, and the process of healing by granulation completed.* In this way the process of cicatrization is explained.

The subject of adhesive inflammation was minutely investigated by John Hunter, and in the chapter of his work on inflammation, entitled "On the Use of Adhesive Inflammation," he has pointed out this admirable contrivance of nature in preventing the extension of diseased action, and in repairing its effects in different structures. Mr. Hunter has also given a description, which has never been excelled in modern times, of the various processes by which this reparation is effected. The first step of the process by which solutions of continuity, whether simple incised wounds or loss of substance in any organ or part of the body are united or regenerated, is adhesive inflammation, which varies in intensity according as the reparation is to be accomplished by the first intention (adhesion), or by the process of suppuration. In the first mode, the inflammatory action never reaches the stage of suppuration; in the latter the inflammation should be moderate in order to insure cicatrization. It is well known to surgeons, that if a wound be irritated during the process of union by the first intention, the adhesive readily passes into the suppurative inflammation, so that the union by the first intention is frustrated; if, on the other hand, the surface of a suppurating wound be irritated during the healing by granulation, cicatrization is retarded and often entirely prevented.

The necessity, therefore, of moderating inflammation in the treatment of wounds, that this action, which is indispensable for the accomplishment of union by adhesion and cicatrization, may never exceed proper limits, or of occasionally stimulating the surface of a sore when the healing process is languid, is thus explained.

In every tissue adhesion is affected, as before explained, by the effusion and subsequent

organization of lymph, which in the course of time is transformed into a new substance, similar to cellular or fibro-cellular tissue, which adheres to the lips of an incised wound, and constitutes the medium or bond of union by the first intention; or it is deposited in the cavity of suppurating wounds, and upon which granulations are subsequently deposited, so as to fill up the vacuity which has been occasioned by the solution of continuity.

In the reparation of cellular tissue, the first stage is the effusion of lymph, which becomes gradually organized, and transformed into a texture so similar to the primary tissue, that it is impossible to distinguish the one from the other except by its greater degree of density or hardness, and that its cells do not communicate so freely, for in oedema the cicatrices of wounds or abscesses do not fill with fluid.

Serous membranes become united by adhesive inflammation, either by union of the two serous surfaces, as we observe in pleuritic adhesions, or when there is a solution of continuity of this membrane, as in wounds of the lungs or intestines. Dr. Thomson, states that in some experiments in which he removed a portion of the pleura pulmonalis, it appeared to be regenerated, as he was unable to distinguish easily the cicatrix from the surrounding parts. Gendrin also found the peritoneum thickened at one point in which ulceration of the intestine had commenced in the peritoneal tunic.

In solutions of continuity of the skin, when union by the first intention takes place, adhesion is effected by fibro-cellular tissue, which nearly resembles in formation the cutaneous structure. It differs, however, in some respects, chiefly in the non-regeneration of areolæ, indentations, or fatty matter. In extensive losses of the cutaneous tissue, the reparation is effected by suppuration, granulation, and the ulterior stage of cicatrization; but although the newly-formed substance is covered with an epidermis so as to resemble the original skin, it never acquires the perfect organization of cutaneous texture; it is less yielding, moveable, and elastic, and without indentations by which sound skin admits of distention. Its vitality is also less active, for, as is well known to surgeons, when an old sore breaks out, the cicatrix is gradually destroyed.

A similar process to that just described appears to take place when portions of mucous membrane are destroyed by ulceration, viz. the effusion and organization of lymph, and the formation of an organized cellular membrane. The newly-formed tissue, however, has none of the properties of a mucous membrane, and never performs the function of secretion. The cicatrix is generally white, contracted, and is neither endowed with villousities nor follicles. We have examples of the healing or cicatrization of mucous membrane in ulceration of the throat, bronchia, and urethra; and in the follicular ulceration which accompanies some forms of fever, and also in ulceration of the mucous membrane of the stomach, or of the colon in dysentery.

* Lectures on Inflammation.

The adhesive inflammation of bloodvessels is exemplified in wounds, or when a ligature is applied to an artery or vein. Effusion of lymph takes place both within the canal and on the surface of the vessel: this fluid becomes organized and finally transformed into a firm fibro-cellular web, which becomes closely connected with the internal and external tunics, and thus obliterates its canal. The fibrine of which the plug is composed is also organized, and may be even injected, shewing the distinction between this substance and a clot of blood.

A similar process takes place in inflammation of veins, which we have shewn to be more susceptible of adhesive inflammation than arteries; and that adhesive inflammation of this system of vessels frequently occurs, and gives rise to important and often dangerous diseases.

In nervous tissue, adhesive inflammation is observed in the reparation of various lesions of the brain and nerves, though pathologists are generally agreed that regeneration of the cerebral and nervous pulp never takes place. The process of adhesive inflammation of the cerebral tissue is exemplified in the obliteration of apoleptic or hemorrhagic cysts, in which, according to Rochoux, the appearance of the effused blood differs according to the duration of its effusion. When death ensues quickly, at the end of three or four days for example, it is in the form of soft blackish clots: after a month or six weeks it becomes firmer, assumes a deep brown colour, and resembles the blood of aneurismal tumours. At a more remote period it becomes still more compact, and of a pale red colour, bordering on ochreous matter; and lastly, it is entirely absorbed. Around the coagulum a layer of lymph is effused, which becomes organized and transformed into a cellulo-fibrous cyst, which separates the clot from the cerebral substance. When the coagulum becomes completely absorbed, the cyst gradually contracts, till its walls approximate, and finally adhere by thin bands of cellulo-fibrous tissue, which in some cases cross the cyst in various directions, so as to connect its opposite sides at these intersecting points. In many instances, however, the cyst remains open and is filled with a turbid fluid.

In wounds or laceration of nerves the divided extremities of the cord are united by lymph, which is gradually transformed into firm fibro-cellular tissue. From experiments which have been made with the view of ascertaining whether the true nervous pulp be regenerated, it is now generally admitted that such reproduction does not take place, the substance of the cicatrix not being capable of transmitting nervous impressions.

When muscular tissue is divided or destroyed, the reparation is not effected by the regeneration of muscular substance, but by very firm fibro-cellular tissue. This newly-formed substance becomes more firm according to the extent to which the extremities of the

muscle are separated. When this is considerable, the intervening substance becomes almost ligamentous, but never acquires either the appearance or properties of muscular fibre.

When solution of continuity or loss of substance of fibro-cartilaginous tissue (cartilage or ligament) takes place, the structure becomes swollen, inflamed, and softened; to which succeed effusion and organization of lymph, which is in process of time converted into dense fibro-cellular tissue; but it is in many respects dissimilar to the primary or original tissue.

The adhesive inflammation of bone is effected first by the effusion of lymph from the periosteal and medullary arteries, softening and swelling of the fractured extremities of the bone, the subsequent organization of their lymph, and its successive transformation, first into fibro-cellular tissue, then into a semi-cartilaginous substance, on the surface of which there are subsequently deposited a number of points of osseous substance. These points of ossification cohere, and form a thick irregular soft bony callus. The thinner parts of this callus are gradually absorbed, the solid bony substance alone remaining; and by the further absorption of the softer osseous particles, the medullary and cancellated structure of the bone becomes ultimately formed.

3. *Suppuration.* Inflammation may also terminate in suppuration or the formation of a fluid termed pus. Various opinions have been entertained as to the mode in which this fluid is produced.

The older writers ascribed it to the breaking down of the solids, and the changes subsequently induced in extravasated blood; some regarded it as the effect of putrefaction of the serum or of the chyle, while others imputed its formation to the wasting or melting down of the fat. In modern times the generally received opinion is, that pus is separated from the blood by a peculiar action of the bloodvessels of an inflamed part, analogous to that of secretion; but in what way this fluid is elaborated is as little understood as the mode by which the various secretions are formed from the parent streams. It would appear, from experiments made on this subject, that pus is formed by a gradual conversion of the coagulable lymph into this fluid. For a detailed account, however, of this process, the physical and chemical character of pus, as well as its mode of formation in different tissues and organs, we beg to refer to the articles ABSCESS and SUPPURATION, and to the section of this article, *Theory of Inflammation*.

4. *Mortification.* Mortification, or the complete death of a portion of the body, although produced by various causes, is not an unfrequent termination of inflammation, though it is a more frequent consequence of acute than of chronic inflammation. The terms gangrene, mortification, and sphacelus, have been used synonymously by many writers. Dr. Thomson has proposed to employ the term *gangrene* to express that stage of mortification which precedes the death of the part; and *sphacelus*, to

denote its complete death or mortification, the circulation and sensibility being completely destroyed.

When gangrene occurs as the effect of inflammation or other causes, or arises spontaneously, it is announced by a change of colour, sensibility, and temperature in the inflamed part. The bright red colour of inflammation is replaced by a deep purple, livid, or blue appearance, which soon passes into a dark brown or black; the affected part becomes insensible to the action of stimuli, while at the same time its temperature is diminished. It loses also the dense elastic feel which it had acquired during the inflammatory state, and becomes soft and flaccid; and if the mortification occur in the skin, the cuticle is raised in vesicles (phlyctenæ), which are filled with a yellow or bloody serum. A putrid odour begins soon after to be exhaled, which increases with the severity of the other symptoms, the progress of which is sometimes rapid, at other times more slow.

The complete death of the part is announced by a great decrease of temperature, a total loss of sensibility, and consequently cessation of pain, and a crepitous sensation produced by the presence of air as a consequence of putrefaction. It is also known to anatomists, that the structure of a sphacelated part is so completely changed that an injection cannot pass into the vessels.

When mortification occurs in external parts, recovery frequently takes place even under the most unpromising circumstances. In internal organs it is almost invariably a fatal lesion. The symptoms which denote mortification in parts of the body important to life are, sudden cessation of pain, remarkable depression of the powers of the system, with symptoms referable more to the typhoid than the inflammatory character; there is great restlessness and uneasiness, but not arising from pain; the countenance becomes anxious, the features shrunk, and the aspect wild and cadaverous; the pulse small, rapid, and irregular; hiccup followed by delirium and cold sweats, precedes the fatal issue.

We have already stated that mortification is more frequently induced by acute than by chronic inflammation. It is, however, important to bear in mind, that the death of parts is not always to be explained either by the degree or duration of inflammation. In certain epidemics, and in some conditions of the system, a state of local vascular excitement, amounting to little more than congestion, is followed by sphacelus of the affected parts. This is seen in the throat during the prevalence of malignant scarlatina, and in some forms of erysipelas: in malignant, eruptive, and typhoid fevers too, the inflammation produced in those parts of the body subjected to pressure or friction frequently terminates in gangrene.

There are few parts of the body which are not subject to gangrenous inflammation. Inflammation of the brain, though subject to all the changes consequent to inflammation,

rarely if ever terminates in gangrene, though its membranes have been found in a mortified state after external injuries. There are certain tissues, however, in which inflammation is more apt to terminate in gangrene than in others. Nature seems also to have endowed the vascular system with a remarkable power of resisting mortification. Surgeons have frequent opportunities of witnessing large bloodvessels exposed, and apparently in a sound state, when the surrounding structures are completely destroyed by gangrene or ulceration. It is well known that in gangrenous parts no hemorrhage follows the division of the sphacelated parts, or even an incision made several inches above the boundary between the dead and living parts. This is owing to the arteries being filled with a coagulum of blood, which adheres to the inner surface of the vessels so firmly as to resist the impulse of the blood when they are divided. In one instance, related by Mr. O'Hallason, no bleeding followed the removal of a limb, though the incisions were made four inches above the seat of gangrene: and Dr. Thomson saw, in a case of mortification of the thigh, a coagulum of blood in the external iliac artery, extending as high as the origin of this vessel from the aorta.

On the other hand, we observe that inflammation more readily passes into gangrene in some tissues and organs than in others. It is observed more frequently, as a consequence of inflammation, in the skin and cellular membrane, in the organs of digestion and respiration, than in other parts of the body. Mortification takes place also more rarely, and makes slow progress in muscular, ligamentous, and tendinous structures.

Besides the occurrence of mortification from inflammation and other external causes, it may arise, without previous inflammation, from the introduction of acrid poisons, from lightning, or the near approach of cannon-balls, or from animal poisons, such as that of the viper, cobra di capello, or the rattle-snake.

Mortification takes place not only as an effect of inflammation, and from the other circumstances just enumerated, but as an idiopathic disease. This form differs in some respects from that arising from the causes alluded to, and has been distinguished by the term *dry gangrene*, from the dry appearance of the mortified part, the skin, cellular tissue, muscles, tendons, and ligaments, being hard and dry, and shewing no tendency to putrefaction. It generally occurs in the lower extremities; and from the arterial trunks being almost invariably ossified, it has been supposed that this form of gangrene arises from this state of the bloodvessels.

It is a remarkable but well-ascertained fact, however, that dry gangrene may be also produced by eating unsound rye. The rye-plum or rye-corn (*secale cereale* of Linnæus) is used in some countries, particularly in the north of Europe, as an article of food, and also affords, by distillation, an ardent spirit. Bread made from rye is less nutritive but more ape-

rient than any other kind. This grain is liable to a morbid growth, more particularly when great heat succeeds to heavy rains. It is a black curved excrescence, not unlike the spur of a fowl, which grows on the spike, and is sometimes found in such quantities as to form nearly one-fourth of the produce of the rye. It is called *secale cornutum*, or the cockspur in rye. In France it is known by the name of the ergot (*siège ergoté*). This diseased growth is attributed to the destructive operations of an insect which perforates the rye-corn and destroys its parenchyma.

Unsound rye has a singular effect on the human body: viz. lassitude, weakness of the extremities, intoxication, and periodic convulsive movements. This state, which has been called *raphania*, or *convulsiones cerealæ*, continues from a few days to several months.

It is stated by Dodard and other writers, that persons who used rye-bread containing a considerable quantity of the diseased grain were liable to a gangrenous affection of the extremities, attended with little fever, inflammation, or pain, though the affected limb became dead, and separated from the body. The limb became at first cold and insensible, and in the progress of the disease dry, hard, and withered. For a full account of this curious subject, the reader is referred to Dr. Thomson's work on inflammation.

Mortification may, when it is slight, terminate, 1. by resolution; 2. by adhesion; 3. by ulceration; 4. by sphacelus, or the death of the part, the last being by far the most frequent termination. (See MORTIFICATION.)

5. *Ulceration*.—When a solution of continuity follows as an immediate consequence of inflammation, the morbid process by which it is effected is called *ulceration*.

Previous to the time of Hunter, ulceration was supposed to be produced by the corrosive power of the fluids of the part in which the diseased action occurred. This celebrated pathologist, however, demonstrated satisfactorily that the solution of continuity was not affected by the acrimonious quality of the fluids, but by the action of the absorbents, the removal of parts or tissues by these vessels constituting the ulcerative process. He designated the formation of an ulcer by simple loss of substance, *ulcerative absorption*; and when the solid parts covering abscesses, aneurisms, and deep-seated tumours, in their progress towards the surface, were gradually removed by ulceration, he applied the term *progressive absorption*.

Dr. Thomson has proposed to distinguish the separation of dead or mortified parts by the term *disjunctive absorption*; but this appears to be an unnecessary refinement of medical terminology. Ulceration may occur as a consequence of every degree or kind of inflammation, not only in soft parts, such as skin, mucous membrane, brain, lung, liver, &c., but also in the texture of bone, in which structure the ulcerative process is termed *caries*. Indeed, we find that all textures of the body are susceptible of ulceration. "We see this exem-

plified," Mr. Lawrence observes, "when mortification has attacked an entire limb, and when the separation takes place by a natural process. Suppose, for instance, that the foot and lower part of the leg were mortified, and that the mortification stop in the middle of the leg, we find that the skin, the cellular membrane, the fascia, the muscles and tendons, blood-vessels, nerves, and even the bone itself, are all penetrated by the process of ulceration."^{*}

Another familiar illustration of the progress of ulceration is observed in the progressive absorption which takes place in an internal aneurismal tumour, in which we find the sac of the aneurism adhering to the parts with which it comes in contact, but after forming an intimate bond of union, the mass is gradually though slowly removed by the process of absorption; even the bone which intervenes between the external surface and the aneurism being finally absorbed.

It is this removal, Dr. Thomson remarks, of one texture after another, first the sac of the aneurism, then the *pleura costalis*, then muscles, bones, cellular substance, and cutis, layer after layer, that Mr. Hunter wishes to express by the term *progressive absorption*—a term sufficiently expressive of the general phenomena which it exhibits, and of the gradual and successive disappearance of the parts which cover abscesses, aneurisms, and tumours, in their constant and uniform progress to the skin. In this process the adhesive inflammation precedes the outward progress of the aneurism, and limits, as in phlegmon, the extent of the swelling, and, as it were, directs it to the surface of the body.[†]

The occurrence of ulceration is much more frequent in some textures than in others, depending on the degree of vascularity of the part which it affects. It is observed also to be a more frequent effect of chronic than of acute inflammation. The skin appears, of all other tissues, to be most susceptible of ulceration. Mucous membranes, cellular tissue, bones, and articular cartilages, come next in order. Fascia, ligamentous structure, and tendons, are the least liable to ulceration. Hence, as Dr. Thomson states, when abscesses form under ligamentous or fibrous fascia, we find that they are long in getting to the surface, and that they seldom arrive at this by the shortest and most direct road, but usually by passing through some texture or organ that is more susceptible of being absorbed.

It is important to remark, however, that inflammation of the same tissue, apparently the same in kind, degree, and duration, will terminate at one time in ulceration, and at another pass off without producing solution of continuity. The importance, therefore, of ascertaining those circumstances which influence the termination of inflammation in ulceration must be obvious.

The mode in which ulceration proceeds in the different tissues and organs, the effects to which it gives rise, and many other points con-

* Lectures on Inflammation.

† Ibid.

nected with this important pathological state, will be discussed in detail under the article **ULCERATION**.

6. *Induration*. This effect of inflammation is frequently observed. When it follows acute inflammation, it depends on the presence of fluids effused into the tissue of the inflamed part; when it takes place as an effect of chronic inflammation, it is more frequently produced by the presence of various solid products to which this process gives rise. Induration is most generally observed in soft spongy cellular organs, as the brain, cellular membrane, lungs, &c., but more frequently in the two latter tissues, in which the induration subsequent to inflammation is often very considerable, and produces remarkable alteration in their structure.

7. *Softening*. An opposite state, that of softening, is not an uncommon effect of acute inflammation. Although it is observed to take place in all tissues, it most frequently occurs in the substance of the brain, mucous membranes, and cellular tissue. As this subject is one of great practical importance, and has of late been very fully investigated, it will be fully considered under the article **SOFTENING**.

8. *Hemorrhage*. Inflammation is often followed by hemorrhage. The effusion of blood may take place from almost every tissue and organ in the body, but more frequently from those parts which are covered with mucous membranes. The various circumstances under which hemorrhagic effusions, as a consequence of inflammation, take place, will be found under the article **HEMORRHAGE**.

Treatment. From the serious and often fatal effects of inflammation, it is of the greatest importance to endeavour to subdue the symptoms on their first appearance, that those terminations or effects we have been considering, some of which have a dangerous and often fatal tendency, may be prevented. The necessity for the adoption of prompt measures is more especially necessary when the inflammation is seated in an organ essential to life, in which the changes of structure frequently go on with great rapidity, so as either permanently to injure the function of the part, or to destroy life. Thus, when inflammation attacks the brain, lungs, heart, or intestines, or when it occurs in parts the organization of which is so delicate that the inflammatory action speedily destroys the structure and functions, as, for example, the retina or iris, the ear, or the larynx, the most energetic treatment should be adopted on its very first appearance. Another reason for the immediate employment of suitable measures in inflammation even in parts which are less essential to life, is, that when the blood-vessels become unduly distended for any length of time; they contract with difficulty, and thus give a greater susceptibility to recurrence of the inflammatory action, or, in other words, a predisposition to relapse.

Before commencing the treatment of inflammation, if any obvious exciting cause exist, it is proper to endeavour to remove it, and also to avoid every circumstance which can tend to keep up local or general excitement.

The object to be kept in view in the treatment of inflammation is to effect resolution. This is, in some instances, the natural and spontaneous solution of the disease, though in the majority of instances it is induced by measures which tend to subdue the local and constitutional excitement. It is necessary, in estimating the probability of accomplishing such a desirable termination, to consider the duration of the inflammation, since we can only hope to bring about resolution in the more early stages. Even although the measures employed prove inadequate to this end from the duration of the symptoms before their application, still the severity or extent of the termination which may have ensued may be materially lessened by the judicious employment of means calculated to subdue inflammatory action.

The remedies by which the symptoms of inflammation are removed have been termed antiphlogistic treatment, that is, remedies against inflammation. We have seen that the capillaries or vessels, which in the natural state admit only the colourless part of the blood, become so enlarged during inflammation as to admit red blood, and from their being thus surcharged, are inadequate to carry on the circulation. We have also seen that with this local congestion the vascular system throughout the body sympathizes, giving rise to symptomatic fever, during which the blood, being impelled with unnatural force, increases the distention and obstruction in the capillary circulation. These circumstances at once shew the necessity of bloodletting as the principal means of removing inflammatory diseases.

In all cases of active inflammation, but more especially when the constitutional symptoms are severe, general bleeding is to be employed, with the object of diminishing the quantity of blood, and, at the same time, of abating the force and frequency of the action of the heart and arteries. The abstraction of blood from the system is more especially necessary in inflammation of important organs, as of the brain, pulmonary and abdominal viscera, in which diseases it forms the principal means of cure.

It is generally found that inflammation of serous membranes requires larger losses of blood than when the parenchyma or substance of an organ is inflamed, and that, on the other hand, inflammation of mucous surfaces is less under the controul of general bleeding; in such cases the local is preferable to the general abstraction of blood.

The propriety or necessity for general bloodletting being determined, the question as to quantity requires consideration. For this there cannot obviously be any fixed or determinate rule, as it must depend on the importance of the organ inflamed, the intensity of the inflammation, its duration, and the peculiar circumstances which each case presents. When an organ important to life is inflamed, and if there be no special circumstances to forbid copious bloodletting, the effect produced on the symptoms is a matter of greater moment than the quantity of blood abstracted.

The too common practice of prescribing a certain number of ounces of blood to be drawn from a vein in an acute disorder is most reprehensible. The disease may yield to the abstraction of a few ounces of blood, or a much larger quantity than was at first anticipated may be necessary. Hence the obvious advantage of the physician superintending the bloodletting he prescribes, in all cases of emergency. Every practitioner must have seen cases in which, though he had imagined a moderate bleeding (sixteen to twenty ounces) would have cut short the disease, a very considerable quantity of blood has been lost before an impression was made on the symptoms. In one case of pericarditis which lately fell under our observation, in which, after the disease had been nearly subdued, a recurrence of the symptoms took place with redoubled violence, according to usual custom twenty ounces of blood were ordered to be drawn from the arm. From the urgency of the symptoms, however, we superintended the operation. No relief of the pain was obtained after twenty, thirty, forty, and fifty ounces were abstracted. When sixty had been taken away, the patient exclaimed, "I now feel relieved." This large bleeding was necessary as a means of relief from most acute suffering. Besides the quantity abstracted, the rapidity with which the blood flows has an important influence on the symptoms. The blood should be drawn from a large orifice, that a decided impression may be at once made on the disease; for which purpose, in cases of inflammation of a vital organ, a vein in both arms may be opened, and the blood allowed to flow till there is an approach to syncope, which may be favoured by placing the patient in the erect posture, whereby the flow of blood to the heart and upper parts of the body is retarded. It is incredible the quantity of blood which some patients have lost before inflammation of an internal organ has been subdued. The late Dr. Gregory used to relate in his lectures the case of a young woman who lost two hundred and thirty ounces of blood in the space of a few days, before an attack of pleurisy was overcome. Such large bleedings, however, are seldom necessary.

The effect of bloodletting, more especially if carried to approaching syncope, in lessening inflammation, may be observed by comparing the state of the conjunctiva in acute ophthalmia, before and after the patient has been freely bled. The distended and tortuous vessels are no longer visible, and for some time after the conjunctiva often remains as pale as in its natural state. The same effect is produced on internal organs, and those structures which are not visible.

It is seldom that a single bleeding is sufficient to subdue active inflammation, even when carried to a sufficient extent. The disease may for a time appear subdued, but when the system rallies, when reaction succeeds to the depression consequent on a profuse bleeding, the symptoms re-appear sometimes with the same intensity as at first, but more generally

in a mitigated form, and require a repetition of the bleeding. We have sometimes seen the abstraction of a few ounces of blood, when the pulse was beginning to rise, indicating the period of reaction, give a final blow to the disease. Hence, in active inflammation, we are disposed to recommend, an hour or two after the first bleeding, the bandage to be re-applied, and a small quantity of blood (eight to ten ounces) to flow from the orifice. Even with this precaution the symptoms in many cases return, and therefore it is necessary to consider those circumstances which indicate the necessity of the further abstraction of blood, and the extent to which it should be carried.

1. There are some particular symptoms from which an indication as to the further loss of blood may be taken. We have observed that the effect of inflammation in an organ is to disturb seriously its functions; hence, when the natural function of an inflamed organ is restored, it is a true criterion of the cessation of the inflammation. When, however, the function of the part is only partially restored, or if, after being completely recovered, it again become disturbed, it is a sure proof that the inflammatory action is still lurking, and may, on the application of a trivial exciting cause, be again called into its former activity. Under such circumstances the further abstraction of blood will be necessary.

2. Another symptom requiring consideration as to the propriety of repeated bloodletting, is pain. In the early stage of inflammation it is more or less acute, but generally mitigated or removed by venesection; and when a moderate bleeding produces partial or complete cessation of pain, it proves that the inflammation has not made great progress. In other cases the relief from pain is less instantaneous or considerable, but takes place gradually with corresponding abatement of the other symptoms, and is often completely removed by local bleeding and counter-irritation. If, however, the pain be only partially mitigated, or its removal be of short duration, or after having been completely removed, it recur, announcing the renewal of inflammation, there can be no hesitation about the necessity of further depletion.

Again, we find that when acute passes into chronic inflammation, the pain abates, and ultimately entirely ceases, which may lead to the impression that the inflammation has been extinguished. Acute pain not unfrequently supervenes in such cases, and announces the conversion of chronic into acute inflammation, requiring a repetition of bloodletting and other measures for its reduction.

It is necessary, however, to remark that young practitioners are too often deceived in the expectation of acute pain in inflammatory diseases. We have already seen that when inflammation is allowed to proceed and to assume the chronic form, the pain abates, and at length finally ceases.

In many of the phlegmasiæ there is no pain, even when intense inflammation is going on. This is more especially the case in inflamma-

tion of the parenchyma of organs; in the brain, for example, in which most active disease may be proceeding even to a fatal termination without any indication of pain. If, however, the symptoms be analyzed, abundant proofs will be given of the existence of serious inflammatory disease. Again, in pneumonia or inflammation of the pulmonary tissue, there is often no pain, the disease being indicated by cough or embarrassed respiration, and the crepitating sound of the breathing; or in cases of latent pneumonia, by the stethoscopic phenomena alone. Even in the advanced or chronic stage of inflammation of serous membranes, the pain abates or entirely subsides, while slow and insidious inflammation is going on. Were the practitioner to overlook such symptoms, and to imagine that in the absence of local pain inflammation did not exist, the life of his patient might be sacrificed.

3. The pulse has from the remotest antiquity furnished an indication of the propriety of bloodletting, and of the necessity for its repetition in acute diseases. In the phlegmasiæ the pulse is increased in frequency, and in volume or strength; and in inflammation of serous membranes it acquires more or less hardness, wiriness, or tension. The object of bloodletting is to reduce these states of the pulse, more especially the hardness, and in proportion as this is accomplished, the operation is beneficial; so that when we fail in removing this hardness of the pulse by profuse bleedings, the issue of the case is seldom doubtful. It is necessary, however, to bear in mind, that in cases in which large losses of blood have been sustained, the reaction is often accompanied with a hemorrhagic throb or jerking of the pulse. We have often seen bloodletting prescribed for this state of the pulse, and observed that it invariably increased by the depletion, the crassamentum of the blood, at the same time, becoming progressively smaller at each bleeding. In these cases there is exhaustion with excessive reaction—a condition of the circulation which tends to impel the blood in inflamed parts, so that bloodletting proves indirectly a stimulating rather than an antiphlogistic measure when employed under such circumstances.

The state of the pulse alone, however, without reference to the general symptoms, is not always a safe criterion of the necessity for bloodletting. We find in many inflammatory diseases that the pulse does not exceed the average frequency or strength observed in health, so that were the practitioner to withhold his lancet solely because the pulse deviated little if at all from its natural state, a serious or often fatal error would be committed. In such cases the degree of pain or other local symptoms of inflammation must regulate the practice. We very lately found it necessary to abstract once and again a considerable quantity of blood from a patient with abdominal inflammation, whose pulse did not reach the ordinary average frequency. In this case it was discovered afterwards that the ordinary quickness of pulse did not exceed sixty. Again, in the early

stages of inflammation of the brain, the pulse seldom exceeds the natural standard, or is often even slower than usual, though it is generally observed to rise after bloodletting. The state of the local symptoms, therefore, is always a more safe criterion of the propriety of adopting active measures in inflammatory diseases than either the pulse or the general symptoms.

4. The appearance of the blood, when drawn, will frequently, in conjunction with other symptoms, afford assistance as to the propriety of further abstraction. We do not think that the buffy coat, which has been regarded as a test of the presence of inflammation, should much influence the decision, as we find it occasionally wanting in inflammatory diseases. When, however, the blood on cooling exhibits the buffy coat, more especially when it is tenacious, the crassamentum firm, the pulse wiry or corded, and the pain unsubdued, it may be confidently predicted that the inflammation is not subdued, and therefore more blood may be safely and advantageously taken. In the advanced stages of inflammation in persons whose powers are feeble, or when blood has been repeatedly abstracted, though the blood still exhibits the buffy coat, it is soft, and the coagulum loose. It appears, indeed, from the experiments of Prevost and Dumas, that when blood has been repeatedly abstracted, the red particles are diminished in number; and were we to judge from the gradual diminution of the fibrine, it would seem that this principle is also lessened. This appearance of the blood shews that inflammation still exists, but that no advantage will be derived from further bloodletting.

5. A most important circumstance, which it is necessary to consider in the treatment of inflammation by bloodletting, is the period or duration of the disease. If the symptoms have been allowed to go on without any effort being made to subdue them, it is vain to expect the same results from the vigorous use of the lancet, as in the more early stage. Profuse bleeding has less influence on the local disease than on the general powers; so that when inflammatory disease has slowly but steadily increased in an enfeebled habit, while at the same time the insidious approach of the symptoms has been overlooked, the patient has a better chance from the judicious employment of modified antiphlogistic measures, of which a moderate bleeding may often form part.

6. It is almost unnecessary to state that the quantity of blood extracted in inflammation must, with other circumstances, have reference to the age of the individual. The diseases of infancy are generally of the inflammatory kind; but it is very difficult to open a vein in infants. In such cases one or two leeches may be applied to the back of the hand or foot, and the bleeding afterwards encouraged by warm fomentations, or immersing the limb in tepid water. In the older infant, the number of leeches must be increased according to age. In some instances the leeches may be applied to the neighbourhood of the inflamed organ;

as by this mode of abstracting blood the local symptoms are not only more speedily arrested, but the general symptoms, with which every form of acute infantile disorder is almost invariably accompanied, are reduced.

In childhood greater advantage is often derived from venesection than in infancy; indeed the active forms of disease at this period of life are too often overlooked, the practitioner being satisfied with the local detraction of blood, while the bolder measure of venesection is required. It is true that blood is less easily drawn from the veins of the arm in children, but there is ample resource in the jugular, from which any quantity may be taken by a little adroitness on the part of the surgeon.

The period of life when bloodletting is most required, and produces the most decided effects, is from manhood to middle age, when the powers are vigorous. After the middle age the powers decline, and the system is less able to contend with active disease, and the remedies necessary for its removal. While at the one period bloodletting may be carried fearlessly to the required extent, the practitioner must be more cautious when he is contending with acute disease at an advanced age.

7. Physicians often derive useful information from observing the prevailing type of diseases. In idiopathic fevers more especially, this knowledge is almost indispensable for the safe conduct of the case. The same observation is applicable to the treatment of inflammation, in which there is often a material difference in the intensity or activity of local and constitutional symptoms, as well as of the power of the system to bear large losses of blood. The most palpable illustration of this is the different types of fever which accompany puerperal or child-bed fever, which is well known to require different treatment according to the prevailing character of the epidemic.

7. Much has been said about the influence of temperament in determining the treatment of inflammatory diseases. The diseases of the sanguine temperament have been supposed to be of a more acute character, and to require a more active mode of treatment, than the melancholic or nervous. Greater weight, we apprehend, has been given to this notion than experience has warranted. Were the acute disorders of those of the melancholic temperament to be treated on this idea, serious errors would undoubtedly be often committed. The fact seems to be that persons of the sanguine temperament are more predisposed in general to acute or inflammatory diseases, and consequently are more frequently the subjects of them than those of the melancholic, bilious, or nervous; but when inflammation has once taken place, there is less difference as to its intensity, from the constitution or temperament of the individual, than has been usually imagined.

We have been considering hitherto those cases of inflammation in the treatment of which general bloodletting is required. It is not, however, always necessary to take blood from the system, the topical abstraction being

often sufficient to accomplish the cure. Cases also frequently occur in which the loss of even a small quantity of blood from the system is followed by considerable inconvenience and exhaustion, though the same amount of blood abstracted locally is followed by excellent effects.

This mode of bloodletting may, therefore, be employed—1. when the amount of inflammation is trivial; 2. when the powers of the patient are too weak to admit of general bloodletting; 3. when the active stage of inflammation has been allowed to pass over, and is therefore little under the controul of general bloodletting; 4. as an auxiliary to general bloodletting, when further loss of blood from the system is deemed unnecessary. Moreover the local abstraction of blood may be often so managed as to secure the advantage of a general bleeding. Thus, when blood is taken from the temporal artery or from the jugular vein in diseases of the brain, the quantity may be so regulated as to obtain this double advantage: hence the preference given to this mode of bloodletting in acute diseases of the brain.

With regard to the mode of abstracting blood locally, cupping is preferable to leeching in all cases in which it can be employed.

The blood is more rapidly abstracted, and the quantity more nicely regulated. There are regions of the body, however, to which cupping-glasses cannot be applied; under such circumstances recourse must be had to leeches in suitable numbers.

Another powerful antiphlogistic measure in the treatment of inflammation is the exhibition of purgative medicines, which not only remove accumulated secretions, but, according to the class of purgatives employed, produce, by their action on the intestinal exhalents, a powerful derivation from the circulating system. Hence great advantage is derived from a combination of cathartics, which may be administered in suitable doses and at longer or shorter intervals, according to the indication to be fulfilled.

By active purging the general powers may be very much lowered; so much so, indeed, that mild cases of inflammation often yield to the exhibition of purgatives alone, though the more sure and efficacious practice is to employ at the same time other antiphlogistic measures, more especially bloodletting, general or local, according to circumstances.

There is another principle on which the beneficial operation of cathartics may be explained, viz. that of revulsion. When a powerful medicine of this class is exhibited, a copious secretion from the surface of the alimentary canal takes place: the sudden removal of so much fluid from every part of the system not only lessens the quantity of liquids in the diseased as well as the healthy parts of the body, but in the general determination to the bowels, the irritation has been supposed to be diverted from the local inflammation to the intestines. We apprehend, however, that the benefit derived from free purging in inflammation is

more owing to the abstraction of fluid, than to the revulsion which may be induced.

The employment of purgatives is more applicable to some forms of inflammation than to others. The circulation in the brain is readily affected by purgatives, as is evident from the paleness of the countenance, and the syncope induced by active cathartics. Hence in all cases of cerebral congestion and inflammation, purging ought never (unless under special circumstances) to be omitted. In threatenings of relapse, the exhibition of purgatives often supersedes the necessity for local or general bloodletting; and from the intimate sympathy which exists between the intestines and brain, the necessity of attending to the proper regulation of the bowels in the stage of convalescence from acute diseases of this organ must be apparent.

In thoracic inflammation purgatives form part of the antiphlogistic treatment. Experience, however, shews us that they are less efficacious in this than in some other forms of inflammatory disease; and, therefore, when there is evidence of pulmonary inflammation, more reliance is to be placed on the general and topical abstraction of blood than on the exhibition of purgatives; and when there is gastro-intestinal complication, they are to be rigidly withheld.

Since the morbid states of the alimentary canal have been so thoroughly investigated, practitioners are more guarded in the exhibition of purgatives in the treatment of abdominal inflammation. It is necessary to sweep out the bowels once or twice by some active aperient in the commencement, except when the mucous membrane is the seat of inflammation. It is a great source of anxiety with many practitioners to procure the free action of the bowels in peritonitis, which led the late Dr. Saunders to remark, in his lectures on peritonitis, that the best mode of opening the bowels is by the lancet; a practical precept in which we perfectly agree, as there can be no question of the mischievous effects arising from irritating the bowels by cathartics at a time when it is most important that every source of disturbance be averted.

When the peritoneal inflammation is subdued, the bowels are readily opened by comparatively mild aperients: indeed, this soluble state of the bowels is a tolerably sure criterion of the subsidence of the peritonitis. Much harm is also often done by injudiciously irritating the bowels after the inflammatory symptoms have disappeared; and we have many times traced the recurrence of enteritis to the constant irritation of the bowels by purgatives administered with the object of simply effecting their evacuation, which may be at all times ensured by emollient glysters, or a small quantity of castor-oil.

If it be necessary to be cautious in the employment of purgatives in peritonitis, it is more particularly so in inflammation of the mucous membrane of the intestines, which is not only a very common primary disease, especially in children, but a frequent complication of other acute disorders. It is unnecessary,

however, to do more than to allude to this subject in this place, as it has been already fully and ably discussed. (See ENTERITIS and GASTRO-ENTERITIS.)

Mercury is a remedy of considerable power in arresting inflammation, either in conjunction with bloodletting, or in cases in which the loss of blood is deemed inexpedient. The beneficial effects of this medicine is best exemplified in the treatment of intis, in which disease its power of controlling inflammation and in preventing the effusion of lymph, or, when effused, of effecting its absorption, are quite perceptible. Another illustration of the powers of mercury in checking the progress of inflammation is observed in inflammation of the larynx and trachea, in which organs, from their delicacy of structure, serious consequences often arise when the inflammation is not speedily arrested.

There can be little question that it exerts a similar influence over inflammation of internal parts, and appears to have a peculiar power in arresting or controlling the action of the capillaries, and of preventing those changes from taking place which are so destructive to the organization of inflamed tissues. In other instances, when the inflammation has assumed a chronic form, and consequently is little if at all under the influence of any form of bloodletting, mercury may be employed with the most decided advantage. The quantity in which it is administered must depend on the violence of the inflammation and the organ that is affected. It is in some cases necessary to bring the system more rapidly under its influence than in others; for instance, in inflammation of the iris, the larynx, or of the trachea. Therefore, after general or local bleeding, two grains of calomel, or five of the hydrargyrum cum creta may be given every alternate hour till there be some decided amendment in the symptoms. In diseases of less urgency, the same quantity may be given at more distant intervals, every four, six, or eight hours, according to circumstances. When the mercury produces purging, it must be combined with opium; or, if opium be improper, some of the ordinary astringents—catechu, kino, or chalk may be employed. Some physicians recommend much larger doses of mercury—ten, fifteen, or even twenty grains of calomel at once, and do not hesitate to repeat these enormous doses at short intervals. We confess we have never seen any case of inflammation which, if curable at all, resisted the more moderate doses we have advised. In the inflammatory diseases of hot climates, which run their course with frightful speed, the rapid introduction of mercury after venesection seems to be the only chance of saving life. In the acute diseases of temperate climates, however, most practitioners prefer the smaller doses, repeated at longer or shorter intervals according to circumstances.

Though mercury is capable of arresting the progress of inflammation when exhibited alone, it is often more successful when combined with opium. This is more especially necessary when there is much suffering from pain.

As a general principle opium is inadmissible in inflammation, until the excitement has been reduced. That it is a stimulant has been proved by most carefully conducted experiments on the lower animals, as well as by observation of its effects on the human body both in health and disease.

We have just adverted to the exhibition of calomel and opium in the treatment of inflammation. The notice of the profession was, many years ago (1783), first directed to the efficacy of this combination in the treatment of inflammatory diseases by Dr. Robert Hamilton, of Lyme Regis. He acknowledged that the practice was first suggested from the favourable accounts he had received from a navy surgeon of the treatment of hepatitis by mercury. He adopted the hint, and found the practice successful in the hepatic inflammation which frequently accompanies the bilious, intermittent, and remittent fevers of this country. He soon, however, found it necessary to add opium to relieve pain, which happily most effectually answered that purpose. The success of this mode of treating hepatitis induced Dr. Hamilton to conclude, that it would prove equally so in every form of internal inflammation. He first prescribed calomel and opium in peripneumony, and was successful in a large proportion of cases, and under a variety of circumstances. The cases of pleuritis, enteritis, and child-bed fever, in which it was employed, also speedily vanished.

The efficacy of this combination in arresting internal inflammation led to its employment in acute rheumatism and in gout; and Dr. Hamilton had the satisfaction of seeing these diseases also give way most readily under its use. The following is a summary of Dr. Hamilton's mode of prescribing it. After bleeding and evacuating the bowels, a pill containing from five to one grain of calomel, and from one to a quarter of a grain of opium, according to the age and powers of the patient, was directed to be administered every six, eight, or twelve hours, according as the intensity of the inflammation and aspect of the disease required,—plentiful dilution with barley-water or any weak tepid beverage being at the same time enjoined. When there was much fever, with dry parched skin, tartar emetic and sometimes camphor were added; this combination had the effect of determining powerfully to the skin, and promoting the action of the kidneys and bowels. After three or four pills taken in the course of twenty-four hours, the symptoms were evidently relieved; in other twenty-four, the disease gave way and soon terminated. If, however, there was no abatement of the inflammatory symptoms in the first twenty-four hours, more blood was abstracted, the calomel and opium given more frequently, and continued till the force of the disease was subdued.

It was remarked that when the mercury induced much sweating and purging, the salivary glands did not become soon affected; but it was not uncommon to observe the patient greatly relieved, though the mercury did not affect the mouth, or produce any visible evacuation,

except a slight increase of urine or insensible perspiration.

The mercurial plan was almost invariably successful when employed early in the disease; but when adopted in the later stages, its efficacy was more uncertain, though when the mercurial action could be induced on the salivary organs, the recovery was more sure. Counter-irritation was at the same time adopted when necessary.

With regard to the allegation that, as the calomel had been combined with other powerful medicines, the beneficial effects might with greater probability be ascribed to them than to the mercury, Dr. Hamilton states, that though he always regarded the opium as of the most essential service in relieving pain, and that the tartar emetic and camphor have sometimes contributed to the cure, he had often seen cases in which tartar emetic, camphor, and opium had been for some days employed without affording the smallest relief; but on the addition of calomel, the symptoms gave way in a very short time; the amendment seemed in many cases, indeed, to take place as the salivary glands became affected.* Subsequent experience has amply confirmed the practical deductions of Dr. Hamilton as to the efficacy of calomel and opium in the treatment of inflammatory diseases. This combination forms an admirable auxiliary to the use of the lancet in internal inflammation; and when the period for bloodletting has passed over, gives the patient the best chance of recovery.

Neither this nor any other remedy, however, must be permitted to interfere with bloodletting in active inflammation. Mercury may assist in controlling inflammation and render less bleeding necessary, but is in itself inadequate to subdue it. It is, in the first place, necessary to break the force of the disease by venesection, and afterwards to exhibit mercury, care being taken not to push this remedy too far, as it has been observed that its specific effects take place very readily when large quantities of blood have been abstracted.

When the inflammation has passed into the chronic stage, which precedes alteration of structure, mercury is the best, often the only mode of removing it.

Many physicians consider that in active inflammation the administration of opium alone, after a full bleeding, is followed by the most happy effects, especially in irritable habits. We have often in our practice, as well as in that of others, witnessed its efficacy. After bleeding the patient to approaching syncope, having regard to the effect rather than to the quantity abstracted, the reaction which generally follows a large bleeding may often be prevented by two grains of solid opium, or a draught containing one grain of pure acetate or muriate of morphia, administered when the faintness is disappearing. The heart's action is thus controlled, while the nervous system is tranquilized; so that the patient enjoys an interval of refreshing sleep, from which he often awakes with a soft skin and freedom

* Duncan's Medical Commentaries, vol. ix.

from pain. In many cases this practice, with a moderate cathartic, is sufficient to arrest the inflammatory disease. If, however, after an interval of three or four hours, the symptoms return, with hot skin and wiry pulse, the blood-letting must be repeated, and two grains of opium with three or four of calomel given as before. It may in these instances be advisable to administer afterwards a few doses of this combination in smaller quantities—two grains of calomel with half a grain of opium at intervals of three or four hours.

This practice has been strongly recommended by the late Dr. Armstrong, who emphatically said of Dr. Hamilton's treatment, that "it deserves to be written in letters of gold, on account of its great practical utility." In a paper written by this physician in the *Transactions of the Associated Apothecaries*, entitled "On the Utility of Opium in certain Inflammatory Disorders," he recommends the more early and free use of opium, evidently considering that the great advantage arises from the administration of the opium alone. He advises, after bleeding to approaching syncope, three grains at least of good opium, to be given in the form of a soft pill; and that strict quietude be enjoined, in order if possible to procure sleep. In some instances Dr. Armstrong found a smaller quantity of solid opium sufficient; but the dose was made equal by a portion of laudanum, which in highly irritable habits is preferable, because the sedative influence of the opium is thus more speedily procured. On some occasions, where a great quantity of blood has been lost in irritable persons, a large dose has been given after venesection, never however beyond five grains of solid opium, nor a drachm of the tincture at once.

The effects of opium thus administered, according to Dr. Armstrong, are to prevent a subsequent increase in the force or frequency of the heart's action, and a recurrence of pain, while it induces a tendency to quiet sleep and copious general perspiration.

Dr. Stokes has recently brought this subject before the profession in an excellent practical paper* in the first volume of the *Dublin Medical Journal*, written chiefly with the view of pointing out the advantage to be derived from the administration of opium in peritonitis, occurring under circumstances where bloodletting cannot be employed. The cases alluded to are—1. peritonitis arising from the escape of fecal matters into the peritoneal cavity, through a perforating ulcer of the intestine; 2. peritonitis arising from the bursting of an abscess into the serous cavity, or from rupture of the intestine induced by external violence; 3. peritonitis occurring after the operation of paracentesis in delicate subjects; 4. low typhoid peritonitis occurring after delivery.

In these cases of peritonitis, the rapid sinking of the vital powers renders bloodletting and

the usual treatment in common peritonitis inadmissible; the indications are to support the strength of the patient as far as circumstances permit, and afterwards to endeavour to prevent the further effusion in the peritoneal cavity, by inducing organization and adhesions of the effused lymph. For this latter purpose, Dr. Stokes thinks, opium in large doses pre-eminently calculated. This practice was first suggested from the successful treatment, by liberal doses of opium, of two cases of peritonitis after tapping, and of another from the effusion of purulent matter into the cavity of the belly. Dr. Stokes gives several cases in illustration of this plan of treatment. In the first he was unsuccessful, which he ascribes to the exhibition of purgatives, from his mind being warped by an early and unfounded prejudice as to the necessity of evacuations from the bowels. In another, after a moderate leeching, a grain of solid opium was given every hour without inducing the slightest affection of the brain, though the patient took, in the course of eight days, one hundred and five grains of opium, exclusive of opiate injections administered with the object of checking a severe diarrhoea which set in for three or four days.

Dr. Stokes has subsequently treated cases of common peritonitis with opium, where bleeding was inadmissible, and has had no reason to change his high opinion of its powers; and further proposes it as a remedy in cases of rupture of the bladder and uterus, in peritonitis after paracentesis, or succeeding to the operation for strangulated hernia, and in pneumothorax from pulmonary fistula.

The favourable results of the treatment of inflammation of the serous membranes by opium has led Dr. Stokes to employ it in the same condition of the mucous membrane, and under similar depressing circumstances. In a very interesting case of severe gastric fever, in which the abdominal symptoms ultimately became alarming from the supervention of severe diarrhoea, which every day threatened death from exhaustion, a grain of opium was ordered every hour, when the patient seemed in articulo mortis: this was continued for the first twelve hours without inconvenience, but with the effect of procuring refreshing sleep. Next day the remedy was repeated in the same dose every second hour; and from this time the improvement was rapid, and ended in final recovery.

Liberal doses of opium seem also to have had an excellent effect in a case of phagedenic ulceration of the throat. We have seen the most astonishing results from large doses of opium in sloughing phagedenic ulceration occurring in connexion with syphilitic symptoms in broken-up constitutions, such as is frequently observed in the lowest order of prostitutes.

Dr. Stokes has drawn the following conclusions on this subject:—1. that in cases of recent inflammation of serous and mucous membranes, where depletion by bloodletting or other antiphlogistic measures are inadmissible, and the system in a state of collapse, the exhibition of opium has a powerful effect in controlling the disease: 2. that under these

* Clinical Observations on the Exhibition of Opium in large doses in certain cases of disease, by William Stokes, M.D. one of the Physicians to the Meath Hospital.

circumstances, the remedy may be given in very large doses, with great benefit and safety : 3. that its effect, then, is to raise the powers of life and remove the local disease : 4. that the poisonous effects of opium are rarely observed in these cases ; the collapse and debility of the patient appearing to cause a *tolerance* of the remedy.

Acute pain may sometimes render the exhibition of opium necessary, even in the acute stage of inflammation. When the pain is so excessively violent as to constitute the most prominent symptom of the disease, and has resisted full depletion and other active remedies, its continuance tends greatly to aggravate the inflammatory action, and may even induce a fatal prostration of the vital powers. Under these circumstances, the subjugation of the pain becomes the most pressing indication, and this is to be effectually accomplished by the administration of opium in doses of from one to two and even three grains. This plan of treatment has proved eminently beneficial in severe cases of peritonitis, of sciatica and acute rheumatism affecting the heart. In those cases attended with extreme pain, two grains of opium may be given at first, and one grain every hour until the pain has subsided. It is necessary that the dose should be increased in proportion to the violence of the pain, and that the remedy be cautiously continued, until it has made a decided impression upon the nervous system, in order to procure the relief intended. It is well known that very large doses of opium are well tolerated when the nervous system is much excited ; but to guard against any injurious effect of this remedy on the brain, a cold lotion may be applied to the forehead, or if necessary to the whole scalp.

There is another condition of the system in which opium is extremely beneficial, viz. in exhaustion from loss of blood. There are some individuals who do not bear bloodletting well even when it is necessary ; in other cases, blood may be abstracted under mistaken views of the nature of the disease, or it may happen that more blood has been taken away than the symptoms either warranted or required.

In those cases of exhaustion arising from the effects of loss of blood, opium, with nourishment and cordials, is the best plan of restoring the patient.

There are some inflammatory diseases in which opium cannot with advantage be prescribed. In inflammation of the brain, it is a doubtful remedy even after the more active symptoms have been reduced. Indeed, in all acute diseases in which the brain is primarily or secondarily affected, the exhibition of opium requires great circumspection. It not unfrequently happens that when the more urgent symptoms of cerebritis have been overcome, the patient continues restless and wakeful, with a cool skin, soft clean tongue, and rapid soft pulse. These symptoms are often decidedly ameliorated by a full dose of opium. In inflammation of the mucous membranes, which generally terminates by an increased secretion, opium, from its tendency to check this salutary process, should be withheld, unless special

circumstances arise to render its exhibition imperative.

Of the other remedies of this class our individual experience does not warrant us to say much in terms of praise.

Digitalis, which was formerly so much extolled for its anti-inflammatory powers, is now rapidly falling into disuse. Though it certainly exerts a peculiar effect on the heart's action, its uncertainty and the length of time which elapses before it produces any decided impression, have tended much to impair the confidence which was at one time reposed in its efficacy in controlling inflammation. We have seen it given in very large doses (ten drops every half hour), and though it lowered the frequency of the circulation, it seemed in many instances to exert scarcely any control over the local disease. From what we have personally observed, therefore, we should not feel inclined to recommend the employment of digitalis as an anti-inflammatory remedy.

Colchicum is certainly efficacious in checking gouty and rheumatic inflammation. Some years ago this remedy was much used as a contro-stimulant in visceral inflammation, and was by some imagined to be little inferior in power to bloodletting. These sanguine expectations, however, have not been realized, and at present the administration of colchicum is almost entirely confined to the specific inflammation of gout and rheumatism, in which cases, we have prescribed a pill containing the acetic extract of colchicum (gr. i.) and extract of hyoscyamus (gr. iii.) every eight hours with excellent effects.

Among the remedies resorted to with the view of resolving inflammation, antimony has always been held in high estimation. Since its first introduction by Paracelsus, antimony has enjoyed more varied reputation in the treatment of acute diseases than any medicine in the *Materia Medica*. After it had been declared a most valuable remedy in many formidable disorders, it was denounced a poisonous medicine, and interdicted under very severe penalties by the French Parliament in 1566. In later times, however, it has been again brought into use, and within the last century has been prescribed as a most powerful antidote to almost every form of febrile disease. Various forms and preparations of this mineral have been from time to time introduced, but after repeated trials of their efficacy only two have been retained. These are the antimonial powder, pulvis antimonialis of the London Pharmacopœia, and the tartarate of antimony and potassa. The virtue of the antimonial powder is not only doubtful, but according to the experience of some physicians it appears to be positively inert, 130 grains having been given by Dr. Elliotson three times a day without producing even nausea. Dr. Thomson has satisfied himself from experimental investigations that the composition of the antimonial powder, and that of James's powder, which the former was intended to imitate, are totally dissimilar. This excellent pharmaceutical chemist states as the reason, that the antimony in James's powder is in the form of a soluble *protoxide*, while that in the

pulvis antimonialis of the *Pharmacopœia* is in the state of an insoluble *peroxide*; and from the ascertained fact that the more soluble the salts of antimony are, the more certain and powerful is their effect on the living body, the cause of the inertness of the one, and the more certain efficiency of the other, is thus explained.

Sometimes the skin becomes moistened, or the bowels gently purged by small doses (two or three grains) of James's powder given every four or six hours. More generally, however, it does not produce any sensible evacuation, the pulse becoming softer, and the skin more cool under its use. It is more efficacious when combined with calomel or blue pill, or occasionally with opium, when there is pain. Thus, after general or local bleeding, a pill containing two grains of calomel or blue pill, the same quantity of James's powder, and a quarter or half a grain of opium, may be given every three or four hours with decidedly good effects, every alternate pill being followed by a saline aperient, should the state of the bowels require it.

The tartarate of antimony and potassa (tartar emetic) is the preparation in most general use. It is seldom exhibited as an emetic, as the action of vomiting in inflammatory diseases is deemed prejudicial, at all events until the general excitement is reduced by bloodletting.

Stohl, however, recommended emetics in pneumonia. We are also told by Laennec, that Riviere vomited his patients in pneumonia with tartar emetic daily, or every second day; and that Dumangin, physician to La Charité, followed this plan, and though he seldom combined bloodletting with it, that his practice was quite as successful as that of Corvisart, who bled much in that disease. Laennec concludes that in these cases, the good effects of the tartar emetic are to be ascribed to the derivation exerted on the intestinal canal.

This mode of treatment still prevails in many parts of the continent, especially in France, as appears from memoirs which have recently emanated from the French press.*

From the well known effects of continued nausea in depressing the heart's action, nauseating doses of tartar emetic are frequently administered in inflammation, in conjunction with other antiphlogistic measures. For this purpose, a quarter of a grain of tartar emetic may be given in solution every two or three hours. The first two or three doses generally produce vomiting, but afterwards constant sickness is the only effect observed. By this mode of administration, the sub-acute forms of inflammation are often resolved, and in feeble habits, when the disease is little under the control of general or local bleeding, this mode of administering antimony is often followed by the most beneficial effects. The more slow or insidious forms of pulmonary inflammation, or the progress of tubercular disease may also often be checked by administering antimony in nauseating doses.

In still more minute quantities, (one-sixth or one-eighth of a grain every three hours,) tartar

emetic acts as a diaphoretic. This mode of administering antimony in inflammatory diseases was extolled by Cullen, and his example was followed by his pupils. It is seldom, however, prescribed alone, but in combination with other remedies of this class, more generally the saline diaphoretics.

Antimony has been at times exhibited in very large doses as an anti-inflammatory remedy, more particularly in Italy; indeed the large doses in which it has been administered by some continental physicians so astonished British physicians, that the accounts inserted in the foreign journals were at first discredited by many, while others supposed that there was a material difference in the chemical composition of the tartar emetic. It has, however, been proved by chemical analysis that there is no essential difference between the Italian and British preparations, besides that the formula given in the respective *pharmacopœias* is nearly alike.

The practice of giving large doses of tartar emetic was revived in Italy by Rasori, who, after embracing and widely disseminating the doctrines of Brown, had an opportunity of witnessing their fallacy in the treatment of an epidemic fever, which broke out at Genoa in the year 1799 and 1800. The application of the Brunonian principles to the management of this epidemic was attended with such fatal results, as to induce Rasori to change entirely the mode of treatment, and to substitute antiphlogistic measures. The practice of *contro-stimulus* which was pursued consisted in bloodletting, followed by large doses of tartar emetic, four, six, eight, or more grains being given in the course of the day in any agreeable vehicle. The success of this treatment was as great as the previous plan had been fatal, and had an important influence in subverting the untenable theories of Brown in the north of Italy. It also induced Rasori to employ the tartar emetic in other acute diseases, more particularly in peripneumony. From the memoir which he published on this subject, (the translation of which afterwards appeared in the *Archives Gén. de Méd.* for 1824,) it appears that after one or more bleedings, or without this evacuation, according to circumstances, he prescribed twelve grains of tartar emetic at intervals daily, which was repeated during the night. If the disease had made considerable progress, he began with twenty or thirty grains, increasing the dose daily till one or even several drams were taken in the course of twenty-four hours. The result of this practice in the hands of Rasori was encouraging. Of eight hundred and thirty-two cases of pneumonia treated by the tartar emetic, one-hundred and seventy-three only died. It was subsequently prescribed by most of the Italian physicians, some of whom published the results, from which it appears to have been even more successful in their hands.

Laennec was induced from these flattering accounts to make trial of it, but at first restricted it to cases of apoplexy. Having occasion some time afterwards, however, to attend two cases of peripneumony in which he thought it inexpedient to resort to venesection, he determined to make trial of the tartar emetic; both patients

* *Mémoire sur les fluxions de poitrine*, par Louis Valentin, M.D. Clinique Méd. de l'Hôtel Dieu de Rouen.

rapidly and unexpectedly recovered, so that he was encouraged to give it in other cases. Laennec did not prescribe it in the large doses recommended by Rasori; indeed his mode of administration is so judicious that it has been generally adopted. The following is a summary of the manner in which Laennec employed the tartar emetic in the treatment of pneumonia. As soon as the existence of the disease was recognised, and the patient was able to bear venesection, blood was first taken from the arm, unless in cachectic or debilitated subjects, in which it was deemed advisable to dispense with this evacuation. Immediately after bleeding, one grain of tartar emetic dissolved in infusion of orange-leaf was directed to be taken and repeated every second hour for six times, after which the patient was allowed to remain quiet for seven or eight hours, if the symptoms were not urgent, or the patient disposed to sleep. If the inflammation had already made considerable progress, the same dose was continued uninterruptedly until there was decided amendment.

It was seldom necessary to give a larger quantity of the tartar emetic, though in extreme cases as much as a grain and a half, two grains, or two grains and a half, were prescribed at the same intervals. Many patients were found to bear these doses of the tartar emetic without either vomiting or purging being induced: more generally, however, it excited vomiting or purging for the first day, but this effect soon passed off, and the *tolerance* (power of bearing the remedy) became established often within twenty-four hours from the time of its first administration. It was even occasionally necessary afterwards to prescribe gentle aperients to keep the bowels open. It was observed also that the tartar emetic was most efficacious when it did not produce any sensible evacuation; and that, although severe vomiting and purging are by no means desirable, the cure of the inflammation was often very satisfactory, when the stomach and bowels were much irritated by the remedy. This may often be checked by combining with the tartar emetic a small quantity of opium. Laennec recommends the addition of one or two ounces of syrup of poppy to the six doses to be taken in twenty-four hours. We have found the irritation very much allayed by adding the dose of the tartar emetic to the common effervescing mixture, to which a few drops of laudanum may, if necessary, be added.

At the end of a few hours, seldom beyond twenty-four, such a decided improvement in the symptoms takes place, that both the patient and the practitioner are encouraged to persevere with the medicine till resolution of the inflammation be effected, when the medicine should be withdrawn gradually by giving it at more distant intervals. It is singular how patients become accustomed to tartar emetic when restored to convalescence. Laennec states that when they are taking their usual allowance of food, nine, twelve, or even eighteen grains of the emetic tartar may be taken daily without their being at all aware of any medicine being given. This is in opposition to the opinion of Rasori, who considers the *tolerance* to be owing

to the excess of stimulus which exists in the system and produces the disease; consequently, whenever this is destroyed by the contro-stimulant effect of the tartar emetic, the tolerance, were this theory correct, should cease, which is certainly in direct opposition to our own experience. We have observed in some cases of pneumonia treated by tartar emetic, that when the patient could bear a grain every second hour, twenty drops of the antimonial solution produced copious vomiting, shewing that this medicine is less emetic in large than in small doses.

Laennec has detailed shortly the several diseases in which the emetic tartar has been found successful in his hands. These were, 1. pulmonary inflammation; 2. inflammation of serous membranes, though he did not appear to place great value on its powers in this class of diseases; 3. hydrocephalus; 4. phlebitis; 5. acute chorea; 6. articular rheumatism; 7. severe ophthalmia; 8. apoplexy; 9. acute dropsy.

No satisfactory explanation has been offered of the mode in which tartar emetic affects the resolution of inflammation. It appears not only to check the progress of inflammation, but to cause the absorption of inflammatory effusions. Laennec affirmed that he had observed, in a case of articular rheumatism, well marked fluctuation of the knee-joint disappear in the course of six hours by the use of this medicine.

The value of large doses of tartar emetic, as a powerful anti-inflammatory remedy, is now established by the united experience of the most distinguished British and continental practitioners. In our own hands, we have seen the most surprising effects produced by it when administered according to the mode proposed by Laennec. We have never found it necessary to exceed twenty grains in twenty-four hours, and when the remedy is at all likely to be beneficial, this quantity need not be exceeded. There are few cases of inflammatory disease in the early stage, which do not yield to prompt bleeding, followed by a few doses of tartar emetic; and in cases which have been so long neglected that the period for bloodletting has been allowed to pass over, it affords the chance best of grappling successfully with the disease.

These are the general measures on which our chief reliance should be placed for the removal of inflammation. There are other points of minor importance to be attended to; for example, the thirst is to be allayed by cooling sub-acid drinks, containing lemon-juice, cream of tartar, or a solution of the pulp of tamarinds. It is also sometimes expedient to endeavour to diminish feverish heat by the free admission of cool air, by light bed clothes, and by administering refrigerants, such as citrate of potash, acetate of ammonia, or nitre. These measures, however, are not to divert the attention from the more active remedies.

The propriety also of removing every source of irritation is obvious; not only is the exciting cause to be ascertained, and, if practical, removed, but excitement of every kind must be withdrawn; hence in visceral inflammation the greatest quietude of body and mind is indispensable. When, therefore, the inflammation is seated in an external part, all use of

the organ must be avoided, and such position adopted, as will be least likely to favour the circulation of the blood towards the inflamed part.

Every kind of food which has a tendency to excite the circulation must be avoided; the very mildest farinaceous aliment being best adapted, and even this should be given in small quantities at stated intervals.

We shall next shortly allude to the local treatment of inflammation.

In all diseases attended with excitement, the free application of cold is decidedly beneficial. In inflammation of the brain, after depletion, the application of cold evaporating lotions, or bladders filled with pounded ice, not only reduces the morbid heat of the scalp, but diminishes the vascular action in the brain. The most powerful mode of applying cold to the head is the *cold dash*, which we regard as little inferior to bloodletting itself; and when the general powers are too weak to render the abstraction of blood to an adequate extent expedient, it is the most effectual mode of arresting the inflammatory action.

In the subacute or chronic form of inflammation of the lung, more particularly in that slow insidious form which attends the formation or progress of tubercles, the local application of cold tends materially to check the progress of tubercular disease. For this purpose the chest is to be sponged daily with vinegar and water, (at first tepid, and afterwards cooled down to the natural temperature,) and after being rapidly dried, the skin should be well rubbed with a coarse towel or flannel. This mode of applying cold has also the advantage of removing or diminishing the susceptibility to cold, which renders the consumptive invalid so liable to returns of the inflammation. In inflammation of the abdomen, cold applications have been recommended by some practitioners. Some years ago Dr. Sutton strongly advocated this practice in peritoneal inflammation, and detailed several interesting cases in which the local application of cold was decidedly beneficial. From Dr. Sutton's observations, this practice appears to be peculiarly adapted to the chronic stage of peritonitis, when the symptoms are not such as to require bloodletting.*

In external inflammation, the application of cold lotions forms an essential part of the antiphlogistic measures. For this purpose a solution of acetate of lead, or a lotion consisting of equal parts of the acetate of ammonia, alcohol, and water, may be employed. These may be used cold or tepid, according to the feelings of the patient.

Warm applications are often very beneficial in inflammation. The warm bath, by producing a powerful determination of blood to the external parts, is often employed with great advantage, more especially in inflammation of the abdominal cavity. For this purpose the temperature of the water should not be too high, (not exceeding 98°,) a greater degree of heat proving a stimulus, and thus increasing the inflammatory action.

* Tracts on Delirium Tremens, on Peritonitis, &c. by Thomas Sutton, M.D. 1813.

The partial application of heat in the form of fomentations is often a powerful mode of reducing inflammatory action, and at the same time of relieving pain. We have an illustration of this in the beneficial effects of the vapour arising from warm water, or the decoction of poppy or hyoscyamus in ophthalmia, and in various forms of external inflammation. Warm fomentations properly applied often prove valuable applications also in internal inflammation. We have often observed excellent effects from them in pulmonary inflammation after general or topical bleeding, and in abdominal inflammation this practice is so beneficial that it is seldom if ever omitted.

The different forms of counter-irritation are employed in certain stages of inflammation with great advantage, after the activity of the symptoms has been subdued. When this has been accomplished, should there be pain, the application of a sinapism or blister to the neighbourhood of the inflamed organ will frequently remove it, and when the inflammation has passed into the chronic form, the repeated application of blisters is decidedly beneficial. Great care, however, should be taken that local stimulants be not applied until the active stage of the disease has been overcome. The principles on which the application of counter-irritants should be employed have been so fully discussed in the articles COUNTER-IRRITATION and DERIVATION, that it is unnecessary in this place to go more into detail. We may, however, just advert to the practice of applying blisters when inflammation has receded from a part it had just occupied, and fixed on another organ, as happens now and then in gout and rheumatism. It has been recommended to apply a blister near the seat of the former disease with the view of recalling the inflammation, but we agree with Mr. Lawrence, that it is better to attack the inflammation vigorously in its new quarters, than to attempt to entice it back to its old seat.

It is scarcely necessary to state, that in determining the measures which may be necessary for the treatment of inflammation, we must bear in view the particular circumstances with which it is accompanied, or which may arise in its progress. For example, we are to consider not only its duration, and degree or amount, but the age and constitutional powers of the individual, and the effect of such measures as may have been adopted. When inflammation occurs in a feeble or exhausted habit, (and the local symptoms may in such cases be intense,) the treatment must be less active. Perhaps a small bleeding may be hazarded, but in general it will be more safe to trust to local bloodletting, with mercury and opium. It is often necessary in such cases to adopt local antiphlogistic treatment, and at the same time to give general support by animal nourishment. Even wine may be occasionally required.

There is another point of great practical importance connected with the treatment of inflammation. We frequently observe, after the employment of active measures, that the symptoms, though much modified, continue; the general symptoms may even be entirely re-

moved, but the local disease is still perceptible; a degree of passive inflammation or local congestion remains, which a further extension of bleeding or purging infallibly aggravates. This is often observed in ophthalmia, and did not escape the observation of Hunter. In other instances the measures adopted produce exhaustion accompanied with morbid irritability, which it is often exceedingly difficult to distinguish from inflammation. Both the local and general symptoms will, however, afford some assistance. The pulse, though quick, will be found soft and compressible, the skin cool, and there is little if any thirst. The local symptoms are slight; there is often very little pain, and when there is, it is transient. What is to be done under these circumstances? Stimuli may reproduce the inflammation; bleeding and other depleting measures will aggravate the symptoms. It is most prudent in these cases to try cautiously fluid nourishment, with a little wine in sago or arrow-root; and if the state of the local symptoms admit of local detraction of blood, a few leeches may be from time to time applied. In short a combination of treatment answers best.

In the treatment of congestions of blood—a subject of great importance, though involved in obscurity—we agree with the precepts laid down by Dr. Barlow. If the congestion arise in a plethoric habit, it is evident that general antiphlogistic measures, more especially bleeding, purging, and abstemious diet, must be resorted to. This plan, however, must not be carried too far; it is sufficient to take off the pressure from the circulation in order to overcome the plethora. Over-bleeding, from the reaction which follows, and the weakness it induces, brings on this very state.

When the local congestion is unaccompanied with general fulness, or when it is the result of irritation, local depletion is to be adopted in preference to the general measures, which are indispensable when plethora exists: indeed, as Dr. Barlow has well remarked, general depletion is not only unnecessary but injurious, enfeebling the system, and awakening those efforts by which the congestion would be naturally relieved. (See CONGESTION OF BLOOD.)

The other measures which in congestive affections may be employed in conjunction with bloodletting, or alone when this evacuation may be dispensed with, are mild purgatives, diaphoretics, warm bathing, counter-irritation, and low diet. These several measures must be varied, and repeated more or less frequently according to circumstances.

Congestive affections, both of an acute and chronic character, are not unfrequently combined with general debility; and there are cases in which a mixed plan of treatment is often indicated, and the management of which requires generally much tact and caution. The general debility is sometimes the *primary* cause of the acuteness and persistence of the congestion; and if such active antiphlogistic remedies be used as increase the general debility, they will inevitably have the effect of aggravating the local complaint. While, there-

fore, it may be advisable, in such cases, to keep the local congestion in check by small topical bleedings, counter-irritation, fomentations, poultices, &c. it is often necessary to strengthen the constitution by the use of tonics, generous diet, and change of air.

In many cases of chronic congestions in which the bloodvessels are relaxed, the resolution of the congestion is often greatly favoured by the exhibition of tonics and stimulants. We may mention, for instance, the good effects of various tonics in chronic catarrhal affections, and in some other chronic pulmonary diseases.

In cases of habitual determination of blood, and of a tendency to attacks of congestion of one particular organ, such as the brain, lungs, &c. bleeding by revulsion (or at a remote distance from the organ affected) occasionally repeated, together with great attention to the regulation of diet, and the general management of the system, is found more effectual than depletion in the neighbourhood of the organ, which often induces an increased disposition to an undue influx of blood, although it may procure momentary relief.

Chronic inflammation differs from acute only in degree. The duration of the disease is of little consequence compared with its intensity. It should also be kept in mind that inflammation which has been for some time in a dormant or chronic state, sometimes becomes suddenly acute, and may require vigorous measures for its removal.

In the treatment of chronic inflammation, there being no constitutional excitement, general bloodletting is seldom necessary, local bleeding by cupping or the application of leeches being generally sufficient, unless there be a degree of feverishness, or the inflammation be seated in an organ over which local bloodletting exerts little controul, when the abstraction of a few ounces of blood from the arm is preferable. The bowels are to be thoroughly cleansed by purgatives, and afterwards a general action should be kept up by alterative doses of mercurials with the milder kinds of aperients, such as rhubarb with manna and Rochelle salt.

Counter-irritation is especially necessary in chronic inflammation. Blisters are less effective than the more severe kinds of counter-irritants, such as tartar emetic ointment, or a plaster made of equal parts of Burgundy pitch and yellow wax, to which a scruple or half drachm of tartar emetic (according to the size) is to be added. Either the tartar emetic ointment or plaster bring out a copious eruption of pustules, which greatly relieves the chronic forms of inflammation. Sometimes a seton, caustic, issue, or the moxa, is employed with great advantage.

In all cases of inflammation, whether acute or chronic, the regulation of the diet is of essential importance. In acute inflammation the mildest food only is admissible; in the chronic, nourishment may be more freely allowed. Indeed it is often necessary to allow moderate support while local bleeding and other measures are employed. Pure air is of most essential consequence in all acute diseases, and often exerts a most decided influence in the treatment

of low kinds of inflammation, which it is often difficult to remove in certain localities.

The general principles by which the treatment of inflammation is to be regulated having been considered, we proceed to state what is necessary to be done when any of its effects or terminations have taken place.

It is necessary, however, to bear in mind, that although the inflammation may have produced either of the morbid changes alluded to, the inflammatory action may be still going on, so that it is necessary to watch the primary disease, as well as its effects. For example, in pleurisy and peritonitis, the liquid effusion in the pleural or abdominal cavity does not necessarily imply that the inflammation of the pleura or peritoneum has ceased: on the contrary, we almost invariably find it necessary in such instances to combat the inflammation on which the effusion depends, at the same time that we attempt the removal of the effused fluid. It is not uncommon to observe, that as the local inflammation is reduced, the effusion disappears simultaneously, or very soon after: in such cases the effusion does not depend, as has been too generally supposed, on diminished action of the absorbents, but on the increased quantity of fluid which is effused from the inflamed surface.

The sudden relief which often follows from bloodletting judiciously employed in cases of acute dropsy is thus explained; and also, how venesection frequently removes dropsical effusion when diuretics in every form and combination have failed. When effusion follows inflammation of a more chronic character, more especially when the powers of the individual are low, it becomes a point for consideration how far any form of bloodletting may be advantageously adopted. In such cases the local abstraction of blood, or other local antiphlogistic measures, may be advantageously combined with such remedies as are calculated to effect the removal of the effused fluid. The various means which are to be employed, as well as the circumstances which are to regulate their administration, have been already considered in the article DROPSY, to which we refer.

The effusion which takes place as a consequence of inflammation of any of the three cavities, may proceed to such an extent as to embarrass seriously the functions of the contained organs, and even ultimately to destroy life. This has led to an attempt to evacuate the effused fluid by an opening. Such an operation, however, is not always practicable, as, for instance, in the effusion which is the effect of acute hydrocephalic inflammation. A few practitioners of more than ordinary boldness have, however, ventured on tapping the cranium in *chronic hydrocephalus*; but though in some recent examples this operation has been successfully performed, we fear the small average proportion of cases in which it has succeeded will scarcely give general encouragement to hazard it.

When effusion to a considerable amount takes place in the pleural cavity, there is little hope of deriving any permanent advantage from the employment of internal remedies administered with the view of promoting the absorption of

the effused fluid. In such cases the chest has been tapped, and with such favourable results, that this operation can no longer be viewed as a hazardous attempt, but the only means of saving the sufferer from indescribable suffering and ultimate death. (See EMPYEMA.)

When peritonitis terminates in effusion, the effect of evacuating the fluid is doubtful: in many instances the fluctuation is not perceptible during life; and even were the fluid detected, more benefit is derived from occasional leeching, counter-irritation of the abdomen, mercury, and diuretics. By a steady perseverance in these measures, abdominal effusion succeeding to peritonitis has been frequently removed under most unpromising circumstances.

When inflammation has terminated in suppuration, similar principles must regulate the treatment, the extent of purulent formations being often materially diminished by a continuance of measures calculated to abate the inflammatory action. The kind and extent of these measures must depend on the active or passive nature of the local as well as constitutional symptoms, the object in every case being if possible to arrest, or if this be impracticable, to diminish the extent of the purulent formation, and afterwards to promote either the absorption or evacuation of the matter. If the suppurative process be accompanied by local or general symptoms, as in *phlegmonous abscess*, it is evident that a persistence in antiphlogistic measures, including general or local bloodletting if necessary, may be required till the excitement is subdued. It is well known also, that a removal of the inflammatory action frequently takes place in an organ after matter has formed, just as acute may supervene on chronic inflammation, or as the inflammatory process may be suddenly renewed in a part recently inflamed. The necessity, therefore, of watching the progress of inflammation in organs in which purulent formations have occurred, is apparent, though the attention of practitioners, it must be confessed, is too often almost exclusively directed by the local measures which are best calculated to assist the evacuation of the purulent matter.

On the other hand, when suppuration takes place in feeble habits, general antiphlogistic measures must be employed with great caution, even though there be evidence of local excitement. In these cases, a moderately stimulant plan of treatment, consisting chiefly in nutritious diet, a moderate use of wine and tonic medicines, is often more successful; and should the local affection indicate too great excitement, this may be moderated by small detractions of blood from the neighbourhood of the part, and such other local measures of an antiphlogistic kind as circumstances may require. In short, the practitioner must have in view, on the one hand, not to retard a salutary process, nor, on the other, to increase or renew the action by which the suppuration has been induced.

When suppuration succeeds to phlegmonous inflammation of the external parts of the

body, various topical applications are found useful. Warm applications are most suitable not only from their soothing, but from their supposed power of promoting the process of suppuration. Fomentations of simple warm water, or of decoctions of anodyne or emollient substances, are to be frequently applied, and the part afterwards covered with a large poultice of bread and water, or of linseed flour, some contrivance being adopted to prevent the escape of the heat and moisture. These applications are to be frequently renewed, as soon, indeed, as they become cool, the principal benefit being derived from their warmth and moisture.

When fluctuation can be detected, whether the purulent matter be collected in a distinct cyst or abscess, or be diffused in the cellular tissue, it becomes a subject of consideration whether the pus should be evacuated by an opening made into the part, or be allowed to discharge itself by the gradual process of ulcerative absorption or spontaneous rupture.

If the abscess be situated near the surface of the body and at a distance from any important organs, surgical interference may generally be dispensed with. There are some circumstances, however, which render it advisable to open abscesses as soon as matter can be detected. For example, when the abscess forms in the neighbourhood of an organ important to life, such as the larynx or trachea; near a large joint; in the vicinity of any of the great cavities; when the matter is deep-seated, or being resisted by an unyielding texture, becomes diffused among other parts where less resistance is offered, as in abscess beneath the fascia covering muscles, in the sheaths of tendons, or under the periosteal covering of flat bones—an early opening should be made for the discharge of the purulent matter. The cavity of the abscess becomes afterwards gradually obliterated by the process of granulation and cicatrization, but this stage of the curative process frequently requires the attention of the surgeon.

The treatment of chronic suppuration differs in many respects from that of the acute. It is often surprising how little constitutional disturbance precedes or accompanies these chronic abscesses, which have sometimes been observed to give no indication of their formation, till attention has been directed to an indolent swelling, which on examination is found to contain fluid. They are frequently observed in individuals of an unhealthy constitution, and more especially in those of a strumous diathesis. Hence, in the treatment, the improvement of the general health must form a more prominent feature than even the local management of the abscess.

Chronic abscesses evince a great disposition to increase in size, but the matter has a tendency rather to become diffused than to approach the surface, or, as it is termed, *to point*. The propriety, therefore, of opening them requires, in general, little consideration, though the mode in which this is to be done is a matter of greater nicety. Mr. Lawrence, in his lectures on inflammation, has very clearly pointed out the local and constitutional effects

which follow when these chronic abscesses are opened in the same way as a phlegmonous abscess. If an aperture be made so as to evacuate the matter, and a poultice be afterwards applied, as is the practice in phlegmonous abscesses, the entrance of the air produces decomposition of the matter; the surface or cyst of the abscess inflames; the purulent secretion is altered, becoming thin, fetid, and very irritating to the parts with which it comes in contact. The constitutional disturbance which is thus excited aggravates the local disease, which, in its turn, reacts on the constitutional irritation to such a degree as seriously to disturb the general health, and frequently to destroy the patient.

The mode of treating chronic abscesses adopted by the late Mr. Abernethy obviates the risk of inflammation of the cyst, and the constitutional effects to which it gives rise. This consists in making a small oblique opening into the abscess so as to allow its contents to escape, the ingress of air being carefully prevented; the aperture is then to be closed, and pressure applied so as to allow of its uniting by adhesion. The object of this practice is to diminish the cavity of the abscess, so that, after it has become contracted, it may be again opened, and afterwards treated in the same way as a phlegmonous abscess, and at the same time to obviate the constitutional irritation which arises from exposing the cyst of a large abscess to the action of the external air.

This mode of treatment is, however, not invariably successful; the cyst often continues to secrete pus so as to distend the abscess to its former size, or, if it be diminished, a fistulous opening leading to a large cavity remains. In these cases, surgeons have succeeded in producing inflammation and adhesion of the cyst of the abscess by passing a seton through it, or by injecting irritating fluids.

The general health is to be improved by nutritious diet, vegetable or mineral tonics, and residence in a pure atmosphere.

The treatment of ulceration must depend on its local or constitutional origin, the acute or chronic character of the inflammation by which it is accompanied, the causes by which it is induced, and the structure in which it occurs.

1. Ulceration may be strictly a local affection, as when it arises on an external part of the body from an external cause, such as a wound or other kind of injury. In this case the ulceration may be either accompanied with little or no inflammatory action, or with considerable local as well as constitutional disturbance. It is evident that in the former, mild local applications, and avoiding exercise or use of the part, will speedily affect a cure; while in the latter, antiphlogistic measures, even general or local bleeding, must be combined with topical applications.

2. When ulceration arises from constitutional causes, in addition to the local treatment it is necessary to attend to the general health. Thus, when ulceration of an external structure arises from syphilitic, syphiloid, cancerous, scorbutic, or scrofulous diathesis, it is in vain to attempt to heal the ulceration by local

measures alone; or should these succeed, the cure cannot be considered permanent until the particular constitutional malady be subdued.

3. Though almost every tissue of the body is liable to ulceration, it occurs more frequently in the skin and mucous membranes. In the former the treatment is often tedious, depending in many instances on the state of health and previous habits of the individual. The local treatment requires attention also to the kind and extent of the local inflammation: this is in some cases of an active inflammatory character; in others it is of a low or chronic kind, the one demanding an antiphlogistic, the other a stimulant plan of treatment. It is inconsistent with this outline to enter more minutely on the treatment of ulcers, and as this belongs more properly to the province of surgery, we beg to refer to the writings of Home, Lawrence, Thomson, Cooper, Bell, Brodie, and others, for much valuable information on this subject.

Ulceration in mucous membranes is more common in some situations than in others, the gastro-intestinal mucous membrane being by far its most frequent seat. We have repeatedly alluded to the latency of gastro-enteritis, and even when it proceeds to ulceration, the symptoms are no less equivocal. Hence arises the uncertainty of any method of treatment except that which tends to arrest inflammation in this tissue. We do not affirm that ulceration of mucous membranes does not cicatrize: this has been demonstrated by the most satisfactory process, not only in genuine cicatrix of ulcers of the stomach and colon, but even in the small intestines. The exhibition of mineral tonics and astringents—sulphate of copper, or the superacetate of lead, in combination with opium,—in intestinal ulceration have been found successful, though some physicians speak of the more powerful vegetable tonics, sulphate of quinine, strong infusion of catechu or logwood, as equally efficacious.

When ulceration occurs in the bucco-pharyngeal membrane from the syphilitic or syphilitoid poison, the treatment must be entirely constitutional; therefore mercury, sarsaparilla, and nitric acid must be given according to circumstances. Phagedenic ulceration of the genital organs requires the application of a powerful escharotic, for example the concentrated nitric acid. We have seen the action of this *specific* in those cases powerfully assisted by liberal doses of opium, to the extent even of a scruple in the twenty-four hours.

Mortification is a frequent termination of inflammation, but it arises also from a variety of other causes. It is obvious, however, that in this place we can only consider the treatment of that form which is the effect of inflammation, and refer for information as to the measures to be adopted, when it takes place from other causes, to various articles in this work, and to the article MORTIFICATION.

The general principles on which the treatment of mortification originating in inflammation is to be conducted, vary according to the circumstances with which it may be associated; for it is inconsistent to suppose that one general

rule can be applicable to every case that may occur. Dr. Thomson has justly remarked, there can be no general plan of treatment equally suitable to the differences which occur in the seat, form, progress, and state of the disease, nor to the various affections of the general system by which it is invariably accompanied.

In all cases of mortification there are some circumstances to be considered before any plan of treatment is determined. 1. Mortification, in respect to its seat, is distinguished as it affects an internal or an external part. 2. It is necessary to determine whether the mortification arise spontaneously, (i. e. from some causes connected with the general system, which are not very obvious,) or whether it originate from some external cause or local injury: and, 3, whether it be of an acute or chronic character.

When inflammation of an external organ terminates in mortification, it is almost invariably fatal, the acute inflammation of which it is the effect being often of itself sufficient to destroy life; when it is not, the system is seldom able to withstand the additional irritation which the mortification induces. If, therefore, the violence of inflammation in an internal organ be likely to terminate in gangrene, the only indication of treatment is to prevent its taking place by active antiphlogistic measures, since it is well known that death almost invariably follows mortification of an internal organ, unless, as very rarely happens, the gangrenous inflammation has stopped spontaneously, and the mortified parts have separated and been afterwards expelled by a natural outlet.

In every disease it is obviously necessary to ascertain and to remove, if possible, its causes; and this is no less important in mortification. When it arises from inflammation, it is necessary to discover whether this action still continues, or has abated or entirely ceased. If the inflammation still continues, it is proper to ascertain its degree, both as respects the general as well as the local symptoms; for we often find that there is considerable local action going on with very moderate excitement of the constitution. When the causes and degree of gangrenous inflammation have been ascertained, the object of the treatment to be adopted is to prevent mortification taking place; or if it have already occurred, to arrest its progress; and if seated externally, to promote the separation of the mortified from the living parts.

To fulfil these indications, the measures to be adopted must have reference to the acute or typhoid character of the symptoms. It is scarcely necessary in the present day to state that no reliance can be placed in the antiseptic medicines recommended by the older authors, on the mistaken idea that mortification depended on putrefaction or decomposition of the solids. Their principles of treatment consisted in endeavouring to prevent or arrest mortification by administering, internally and externally, medicines which were known to prevent the decomposition of dead animal matter. These were chiefly the more powerful vegetable and mineral tonics, and various local stimulants applied to the mortified parts. It is true that in certain states and stages of mortification

the same measures are in the present day employed, but on very different principles, no one attributing their good effects to a supposed power of preventing putrefaction by their chemical operation, but to their action as general corroborants or stimulants. The practical error committed by those who ascribed the advantages which occasionally resulted from the exhibition of these remedies, was not only in the principles on which they were administered, but in their indiscriminate adoption in every stage and form of mortification, even in cases which originated from acute inflammation. We shall presently shew that they have their value even among modern pathologists; and in stating our opinion, we wish to impress on the reader that we are desirous of guarding the inexperienced against erroneous principles of application, rather than against the remedies themselves.

In acute mortification, the general and local excitement require the adoption of antiphlogistic measures modified according to circumstances. General bloodletting, if the pulse be full and hard, and there be great local pain and redness, will be necessary, and must be repeated till the pulse become soft, and the other symptoms are moderated. The other parts of the antiphlogistic treatment, consisting of purgatives, saline diaphoretics, and abstinence from stimulating food, must be at the same time enjoined. These measures are necessary in the early stage of acute inflammation, not only to prevent mortification, but, when it has begun, to check its further progress. The extent to which bloodletting and the other antiphlogistic measures are to be carried requires nice discrimination, and especially reference to the age, powers, and previous habits of the individual, as well as to the stage of mortification. The pulse in these cases is often a fallacious guide, more especially when the mortification occurs in a vital organ. The practitioner must, therefore, consider rather its particular character with regard to fullness or hardness, than to frequency. If it be soft, though frequent, and if the skin be cool,—moreover, if the individual be of an irritable habit, and somewhat advanced in years, the lancet must be withheld, as under such circumstances detraction of blood would increase the irritability of the heart's action, weaken the patient, and favour the progress of the mortification. Such symptoms, which are often mistaken for inflammation, require attention to the state of the bowels, the moderate use of opium, the exhibition of mild nourishment, and the moderate use of wine. In other instances the state of the general as well as of the local symptoms indicates sub-acute inflammation—a condition intermediate between acute and chronic mortification, requiring a modification of the antiphlogistic treatment, according to existing circumstances. A full bleeding from the arm may be necessary or advisable, to diminish the velocity and force of the circulation, though, in many instances, this may be dispensed with; local bleeding by the application of leeches at a short distance from the mortified part, purgatives, antimonials, mercury, and low diet,

being generally sufficient to arrest the progress of the mortification.

When the treatment adopted has succeeded in abating the inflammation, and when the progress of the mortification is consequently arrested, further antiphlogistic measures must be suspended, and the powers of the patient reserved for what the system has yet to accomplish—the separation of the mortified from the living parts. In the external parts of the body this is indicated by a red line, which shews the boundary of mortification, and, at the same time, that the process has stopped.

A certain degree of inflammation is necessary to carry on the separation of the dead from the mortified parts; and if the powers of the system be feeble, it is evident that this salutary process cannot proceed. In this stage the patient must be supported, especially if advanced in years, by animal food in the form of strong broths or jellies, and in some cases wine and other diffusible stimuli may be given according to the indications. It is necessary to be very cautious, however, that these measures be not adopted too early or before the inflammatory action be sufficiently reduced, and if they seem to renew the inflammatory excitement, they must be administered in small quantities, or altogether withdrawn, and mild vegetable nourishment substituted. A similar tonic plan of treatment is requisite when the general fever assumes a typhoid type, which it frequently does very early: in these cases the mortification often proceeds with great rapidity, and the only chance of arresting it is by the liberal administration of stimuli, animal nourishment, cordials, and wine.

From the supposed virtues of the Peruvian bark in preventing or arresting mortification, it is necessary to allude to it more particularly. About a century ago it had acquired considerable reputation for its supposed antiseptic powers, and was consequently extolled as a remedy possessing great power in the treatment of mortification. It is probable, however, that its indiscriminate adoption led to frequent failures; it consequently fell into disrepute, and its exhibition is now confined entirely to mortification accompanied with typhoid symptoms, in which other remedies of a stimulant and tonic kind are found useful. It is obviously an improper remedy when there is inflammatory excitement, when there is derangement of the stomach and bowels, or when the mortification succeeds to inflammation produced by external injury. When it is indicated, the sulphate of quinine is the best form of administration, in doses of two grains repeated at suitable intervals. When either the bark in powder, infusion, or decoction, or the sulphate of quinine disagrees, or proves too stimulating, an infusion of some of the lighter vegetable tonics, *cascarilla*, *gentian*, or *calumbo*, may be substituted; to an infusion of either of these an aperient, such as the infusion of *rhubarb*, may be added, should the state of the bowels require the combination.

Opium, when administered in proper cases, is an invaluable remedy in mortification; it soothes pain, and diminishes the restlessness

and irritability with which mortification is so frequently accompanied, and often procures sleep. In the acute stage of mortification, it is improper until the excitement has been subdued; it may then be given at distant intervals in combination with calomel. One grain of opium combined with two of calomel in a soft pill may be given every six or eight hours, if there be pain, irritability, and wakefulness; and should this quantity fail to procure sleep, two grains of solid opium may be given once, or perhaps twice in the twenty-four hours. This remedy is more especially indicated should spasms or convulsions arise in the progress of the mortification. The late Mr. White of Manchester recommended, in spasmodic contractions and convulsions arising during mortification from external injury, large doses of musk and volatile alkali, which he asserted removed the singultus, subsultus tendinum, and convulsive spasms, while at the same time the mortification was stopped. We agree, however, with Dr. Thomson as to the doubtful efficacy of these remedies under the circumstances mentioned by Mr. White, more particularly as this eminent surgeon candidly confessed he had been disappointed in the effects of this combination, when it was tried in mortification arising from other causes.

When mortification on the surface of the body has terminated in sphacelus, the separation of the mortified from the living parts may sometimes be assisted by local applications. In former times, the practice of surgeons was to make incisions or scarifications through the dead down to the living parts, in order to apply stimulating and, as was supposed, antiseptic substances, such as turpentine, balsams, and even essential oils, regardless of the degree of local inflammation which already existed or might be produced by such applications. Mr. Samuel Cooper has very well remarked, that though such things are indeed really useful in preserving dead animal substances from becoming putrid, a very little knowledge of the animal economy is requisite to make us understand that they cannot act in this manner on parts still endowed with vitality; but on the contrary, that they must have highly prejudicial effects in the cases under consideration, by reason of the violent irritation which they always excite when applied to the living fibres.

Any local application is unnecessary, and often injurious before the mortification has stopped. This, as we have seen, is indicated by a defined red line, which shews the separation of the mortified from the living parts: the living portion adjoining the sphacelus assumes a red colour, ulcerative absorption commences, by which the mortified are gradually removed from the living parts.

The object of local applications is, 1. to soothe the local irritation; 2. to allay any excitement in the part that may arise; 3. to accelerate the process of separation when it proceeds too slowly; and, 4. to correct the fetor.

The most soothing application is a common poultice made of stale bread or lintseed flour and water, and in nine cases in ten this forms the best local application in mortification.

When the heat of a poultice produces too much irritation, a cold lotion, or if more agreeable to the feelings of the patient, a tepid lotion may be applied by means of one or two folds of linen. It should be remembered, however, that while heat increases the local action, cold, on the other hand, though it at first diminish or repress vascular action, when too long applied produces debility, and may be consequently injurious.

When it appears expedient to stimulate the living parts, several local applications are employed by surgeons. Mr. Lawrence recommends the nitric acid, of which from four to ten drops may be added to an ounce of distilled water, and lint moistened in this lotion applied to the part. The pyroligneous acid has also been applied with advantage, more especially in hospital gangrene. A liniment, composed of oil of turpentine and resinous ointment in equal proportions, is an excellent stimulating dressing in mortification. The mode of applying this liniment is to moisten lint in it when made warm by putting the vessel in which the liniment is contained in boiling water, by which it is soon liquefied. The lint soaked in this liniment is to be put on the part, which is to be afterwards covered with a large warm poultice. This dressing may be renewed once or twice a day or oftener, according to circumstances.

Various kinds of stimulating poultices have been recommended. The common yeast poultice, prepared by adding to the grounds of stale strong beer, as much bread crumb or lintseed flour as will make a poultice, answers very well: or some surgeons prefer the effervescing poultice, prepared by adding to an infusion of malt as much oatmeal as is necessary to form a poultice, and afterward mixing with it a tablespoonful of fresh yeast.

When the ulceration looks healthy, and the process of separation goes on satisfactorily, the stimulating ingredients in the dressings must be diminished or wholly withdrawn. Dr. Thomson has shown that the ulcerating surface is, in the progress of separation, liable to pass, under every mode of treatment, into the state of a painful and irritable ulcer; and in this state it may require to be treated with anodyne fomentations, or with poultices made of carrot, turnip, or fresh hemlock leaves. In these cases, as in sores from other causes, the applications require to be frequently changed, which has often a most beneficial effect on the ulceration.

With the view of correcting the fetor arising during the process of separation of mortified parts, charcoal has been employed. The common charcoal poultice is made by adding to a common bread and water or lintseed poultice, two ounces of finely levigated charcoal: this application generally destroys the fetor arising from the mortified parts.

The disinfecting agents which have been lately introduced—the chloride of lime, or of soda—when applied in proper strength to a gangrenous sore, remove very effectually the unpleasant smell, and may, therefore, be employed in conjunction with the other local measures. We distrust, however, the accounts given by the French writers of their power in

arresting the progress of mortification; in our opinion, they are useful only in correcting the fetor, and cleansing a foul sore.

When an extremity has become mortified, it is necessary to remove it to save the patient's life. The general rule adopted by surgeons is, to defer amputation until there is decided evidence that the mortification has stopped; but for information on this important point, we beg to refer to the writings of those surgeons who have discussed this point of practice.

It is necessary to advert to the treatment of mortification arising from unequal pressure on those parts on which the body rests, when an individual has been long confined to bed. The parts which are most liable to mortification from this cause are thinly covered with flesh, viz., the sacrum, hips, scapulæ, elbows, and sometimes the cartilage of the ears, and the skin covering the cranium. It takes place more especially in diseases attended with debility, as in the advanced stage of continued fever, in the typhoid forms of which there appears to be a tendency to gangrenous inflammation; it occurs also in bad compound fractures, in cases of tedious suppuration, and in paralysis; it is much favoured also when the evacuations are passed involuntarily.

According to Dr. Thomson there are two forms of disease arising from pressure, which are not always accurately distinguished; the one is mortification; the other a chafed, excoriated, and ulcerated state of the same parts; the mortified state, however, being always an indication of a greater degree of weakness. They not unfrequently occur in the same diseased surface, a part in which a mortified slough or eschar has been formed, passing very readily into ulceration, so that a sore, which at first was small, often acquires in this way a very large size.

The treatment depends on the circumstances with which each case is accompanied. When mortification occurs from pressure in the low or typhoid forms of fever, the strength must, as a general rule, be supported, unless special symptoms arise to render the tonic plan inexpedient. It is important, however, to discriminate the irritative fever which the mortification frequently induces, after the primary febrile symptoms have nearly or entirely disappeared.

When ulcerative or gangrenous inflammation arises in diseases in which the system is less disposed to mortification from failure of the vital powers, as in paralysis, bad compound fractures, and long-continued suppurations, there is less necessity for stimulants; mild nourishment, great attention to cleanliness, and suitable local applications, with attention to relieving the unequal pressure, forming the best plan of treatment.

For the purpose of obviating the unequal pressure sustained by those parts on which the body rests, various contrivances have been invented. A soft down pillow, or an air-cushion, may afford temporary relief. The bed invented by Mr. Earle is well adapted for many surgical diseases which require for their cure long confinement in one posture. The frequent failures of these various contrivances, however,

led our scientific friend Dr. Arnott to construct a *hydrostatic* or *floating* bed for invalids, on the following ingenious principle—that the support of water to a floating body is so uniformly diffused, that every thousandth of an inch of the inferior surface has, as it were, its own separate liquid, so that no one part bears the load of its neighbour; that a person resting in a bath is nearly thus supported; and that, though the pressure of the atmosphere on our bodies is fifteen pounds per square inch of its surface, yet because it is uniformly diffused, it is not felt. He also reflected that the pressure of a water-bath of depth to cover the body is less than half a pound per inch, even on the under side, where it is greatest, and similarly unperceived; and therefore concluded, that if a patient were laid upon the surface of a bath, over which a large sheet of India-rubber cloth (which is quite impermeable to water,) is thrown, the body being rendered sufficiently buoyant by a mattress placed under it, the invalid would repose on the face of the water without sensible pressure on any part, and almost as if the weight of the body were annihilated.

A bed constructed on this principle and made in the following manner has been found to effect this desirable object. A trough of convenient dimensions (six feet long, thirty-two inches wide, and eleven inches deep, are good common dimensions) is to be lined with lead or zinc to make it water-tight; this trough is to be half filled with water, and over it is to be thrown a sheet of the India-rubber cloth as large as will be a complete lining to it if empty. The edges of this sheet are to be touched with spirit-varnish, to prevent the water creeping round by capillary attraction, and to be afterwards secured, in a water-tight manner, all round to the upper border or top of the trough, the only entrance left being through an opening at one corner, which can be perfectly closed. Upon this dry sheet a suitable mattress is to be laid, and a bed is thus constituted ready to receive its pillow and bed-clothes, and cannot be distinguished from a common bed but by its surpassing softness or yielding.

When an invalid is placed on this bed, the body, being (as is known to swimmers) nearly of the specific gravity of water, displaces water equal to his own body, in weight as well as in bulk, and is supported as the displaced water would have been. If a mattress of a certain thickness be placed under the body, after the weight of the body has forced two cubical feet (the average bulk of the human body) of that under the level of the water around, he will float with four-fifths of his body above the level, and will sink much less into his floating mattress, than in an ordinary feather-bed. If unusual positions be required, by having the mattress formed of different thickness in different parts, or by placing a compress of folded blanket or of pillow under the mattress in certain situations, any desired position of the body will be easily obtained.

The hydrostatic bed does not admit of the perspiration being carried off, and unless the invalid can leave the bed so as to admit of its being aired daily, like an ordinary bed, it is

necessary to adopt a plan of ventilation in order to prevent the perspiration from being condensed on the water-sheet below. This Dr. Arnott has proposed to effect by placing under the mattress, arranged like the bars of a gridiron, small flexible tubes of copper wire, wound spirally, with their ends open to the atmosphere, either directly or through two larger tubes, crossing and connecting their extremities near the ends of the mattress, and then issuing at the corners of the bed from under the clothes.

This bed is therefore admirably adapted not only to every disease requiring long confinement to bed, but to cases of fractured bones, palsy, and diseases of the hip and spine. It also allows the patient, when capable only of feeble efforts, to change his position almost like a person swimming, and thus even to take a degree of exercise. It also enables the attendant to dress wounds, apply poultices, or to place vessels under any part of the body, as the elastic mattress may at any part be pushed down, so as to leave a vacant space, without the support being lessened for the other parts.

With regard to local applications, when the skin is merely inflamed without excoriation or detachment of the cuticle, the part should be frequently bathed with camphorated spirits of wine, or a solution of the acetate of zinc, or with a liniment made by triturating equal parts of alcohol and the white of an egg, and afterwards covered with soap cerate spread upon leather. When the skin is excoriated, spirituous applications are improper, the mildest emollients—the lin. calcis, simple cerate, or the zinc ointment—are suitable, and, if there be much irritation, an emollient poultice may be placed over the dressing.

When mortification, terminating in sphacelus, has taken place, a bread-and-water or carrot poultice is the best application, and if the separation of the sphacelus proceeds too slowly, a stimulant dressing, such as the resinous and turpentine before mentioned, may be applied for a short time, but it must be removed if it produce pain and irritation.

When the sphacelus has been completely detached, the sore is to be treated as a simple ulcer, the dressings being varied according to the state of the ulcerations.*

(A. T.)

(Adair Crawford.)

(A. Tweedie.)

INFLUENZA. (*Epidemic catarrh.*) The disease now commonly known by this name, first given to it by the Italians, was not particularly noticed by physicians before the sixteenth century. Since that period it has many times appeared in Europe and in other quarters of the globe. Influenza seems to bear the same relation to ordinary catarrh that epidemic

cholera bears to the common or sporadic cholera that occurs every year. Of all epidemic diseases it is the most universal; and the rapidity of its march and extent of its range over land and sea, sometimes in both hemispheres and in different climates, in opposite seasons and in all varieties of weather, among people of all classes, naturally led to the supposition that some extraordinary influence could alone give rise to such a wide-spreading malady. The French call it *la grippe*, under which name Sauvages first described the epidemic catarrhal fever of the year 1743.

To collate the various accounts of any one visitation of this epidemic, such, for example, as that of 1775, or of 1782, or of 1803, in order to deduce some general principles respecting its mode of propagation, pathology, or treatment, would occupy a considerable treatise: it must, therefore, be an elaborate task to draw general conclusions from all the records we now possess of this singular disease, and to condense them in a space suitable for a work like the present. Limited by this circumstance, we shall take a brief survey, first, of the most remarkable dates of its appearance and progress in the last three centuries; secondly, its symptomatology; thirdly, its treatment; fourthly, facts and general inferences relative to the causes of it, such as phenomena of the weather and diseases among brutes; fifthly, its contagious property; and, sixthly, its influence on other diseases, and connexion with diarrhoea, dysentery, and cholera.

I. We find no medical description of the epidemic catarrhal fever before the year 1510. "It was called *cocoluche*, because the sick wore a cap close over their heads." The symptoms of the disease, as it then occurred, nearly resembled those which it has assumed in later visitations, namely, severe pain over the eyes, sneezing, coryza, heaviness, difficulty of breathing, hoarseness, loss of strength and appetite, fever and harassing cough. Schenk says that physicians then looked upon it as a new disease. Its course seems to have been in a north-westerly direction, from Malta to Sicily, Spain, Italy, Germany, France, and Britain; and Short says that "it attacked *at once*, and raged over all Europe, not missing a family, and scarce a person, and that none died except some children. In some it went off with a looseness; in others by sweating. *Bleeding and purging did hurt.*"*

In 1557, an epidemic of the same nature prevailed in different countries. Fonseca says that in this year it infested Asia, thence came to Constantinople, and having spread itself all over Europe, afterwards attacked America, its course being westerly. Mercatus asserts that "before the beginning of autumn 1557, it attacked all parts of Spain *at once*, so that the greatest part of the population in that kingdom were seized with it almost on the same day."†

* We omitted to state, in describing one of Kaltenbrunner's experiments, p. 720, that, after repeating these experiments, we have not been able to distinguish the ulcers alluded to, though this author affirms that he has distinctly observed them with the microscope.

‡ The portion of this article which precedes the initials A. C. is written by Dr. Crawford, and the succeeding portion by Dr. Tweedie.

* Short's Chronol. Hist. of the Weather, &c. vol. i. p. 204; and Dict. des Scien. Méd. Art. Grippe, p. 351.

† See Report, by Dr. Glass, in Lettson's Memoir of Dr. Fothergill, 4to, p. 625.

Riverius has transmitted to us an account of this epidemic. Unlike that of 1510, it was fatal to many: in a small town near Madrid, Mantua Carpentaria, bleeding was said to be so fatal that two thousand patients died after it in September.* At Alkmaer, in Holland, two hundred died of it in October.

The catarrhal epidemic fever of 1580 was distinguished by its complication with malignant fever or plague, as related by Forestus and Sennertus.† The latter speaks of its ravages at the end of summer and the beginning of autumn over all Europe; in some parts of which, as in Paris, it was the *precursor* of the plague.‡ It was in Sicily in June, at Rome in July, in August at Venice and Constantinople, in September in Hungary and Germany, in October on all the Baltic coast, in November in Norway, in December in Denmark, Sweden, Poland, and Russia; its course being from E. and S. to W. and N.§ Mercatus says that it raged also in Spain, and destroyed not a few.|| Grand Cairo lost a prodigious multitude the same year by the plague. It is a remarkable fact, and ought not to escape our notice, that France appears to have been the only country in Europe affected that year by the plague; and it appears also to have been the first to be visited by the epidemic catarrh, its precursor; so that Baldutius even dates its origin from France.¶

The influenza of 1658, of which Willis has left us an account, visited Europe and this kingdom *suddenly* in April, and after excessive heat in August was followed by a fatal epidemic fever.**

Sydenham and Etmuller have described the epidemic catarrh of 1675, which began in Germany in September, and in England in October. Malta was afflicted by the plague the same year, from which it remained free till the last severe visitation of this scourge in 1813.

The epidemic catarrhal fever which raged during the autumn and winter of 1729, in the space of five months' time visiting almost every part of Europe, was very fatal in many large cities, such as Paris and London. Loew says that in the latter more persons died than at any one time since the plague of 1665, about one thousand being cut off weekly in September. In the beginning of winter it reached France. A few weeks after, it visited the upper part of Italy with great mortality. In February it afflicted Rome and the Rhine. Turin and Milan suffered extremely. It reached Naples in March, and after this disappeared.††

The influenza of 1732-3 is described in the second volume of the Edinburgh Medical Essays, and by Huxham; and was so far remarkable that it affected the mucous membrane of the alimentary canal as well as that of the organs of respiration. It spread over all

Europe, and appeared also in America. It was first noticed about the middle of November in different parts of Germany. Edinburgh appears to have been the first place attacked in Britain, viz. on the 17th of December, and it raged at the same time in Switzerland, at Basle. It appeared at London and in Flanders the first week in January; towards the middle of the same month it reached Paris, and Ireland towards the end. Cornwall and Devonshire were visited about the beginning of February; few only were attacked at Plymouth, where Huxham practised, so soon as this; but in March it prevailed on all sides. In February Leghorn was attacked, and near the end of it Naples and Madrid suffered. New England in America was invaded by the distemper about the middle of October, which travelled southward to Barbadoes, Jamaica, Mexico, and Peru, much at the same rate as it had done in Europe. It appears to have been at Paris early in the year. "Elle se manifesta, dit de Jussieu, à la suite de brouillards fétides, plus épais que les ténèbres de l'Égypte."**

The epidemic catarrh of 1733 was followed by those of 1741 and 1742; the first described by Haller, and the second by Sauvages and Huxham. In 1743, towards the end of April, Huxham says that it was general in England, and in the spring spread over all Europe under the name of "influenza," or "grippe." This epidemic was the *precursor* of the plague of Messina in Sicily the same year; and it was more fatal in the southern parts of Europe than in England, though it increased the deaths in London in one week to a thousand.†

The next remarkable visitation of the influenza was in 1762; and an elegant description of it is given by Sir George Baker, "De Catarrho Epidemico anni 1762," who records its appearance in London about the 4th of April. Razoux, a physician of Nismes, has given an account of the same disease, which was epidemic in Europe generally in the spring.‡ It attacked Breslau at the end of February; Vienna was visited in March, and Hamburg in April. In Venice it was more fatal than in other places. It spared, however, Paris and the greatest part of France; nor can we find any particular cause for this exemption. Nismes most probably was visited; and Webster says that "Toulon lost one-third of its inhabitants by an epidemic in 1761." The influenza of 1762 appeared sooner in London than in any other part of England, namely, the beginning of April. It was not observed in Edinburgh and Dublin till May; but in June it was general and severe, according to Sir G. Baker, being seen no where earlier than February nor later than July. It had prevailed in America the preceding year.§ It was not till July that it attacked the British sailors in the Mediterranean. It was immediately followed in London by an epidemic dysentery, which raged till November. While the influenza prevailed,

* Short's Hist. vol. i. p. 223.

† Dict. *ut supra*.

‡ Webster's Hist. of Epidemics, vol. i. p. 263.

§ Short's Hist. vol. i. p. 262.

¶ Dr. Glass, *ubi supra*. ¶ Short's Hist. i. 262.

** Short's Hist. vol. i. p. 331; and Webster's Hist. i. 310.

†† Short, ii. p. 54. Hoffmann, Opera, tom. ii. p. 109.

* Edinb. Med. Essays, vol. ii. p. 31. Huxham, de Aere, &c. tom. i. Dict. des Scien. Méd. art. Grippe.

† De Aere, &c. tom. ii. p. 104.

‡ Dict. art. Grippe.

§ Webster's Hist. i. p. 410.

the deaths in London scarcely exceeded the usual number. In Manchester they were even fewer than common; and at Norwich far more died of it than fell victims to the *more severe* influenza of 1743.*

The next epidemic catarrh, in order of time, was that noticed in London and different parts of the nation by Dr. Fothergill and some of his friends in the latter end of the year 1775. It was observed also in France, Holland, and Germany, and was supposed to be more fatal in those countries than in Britain.†

The influenza of 1782 was general over England, Scotland, and Ireland, between the months of May and July inclusive. A full account of it is given in the second volume of *Memoirs of the London Medical Society*, by Dr. R. Hamilton, which is the groundwork of the article "Influenza" in the *Edinburgh Medical and Surgical Dictionary*; an account is also given in the first volume of *Medical Communications* by Dr. Gray, compiled from papers in the British Museum, which is the basis of a like article in the *Cyclopædia* of Dr. Rees. (See also the third volume of *Transactions of the College of Physicians*, London.)

The influenza of 1782 seems to have pursued a course from the east, not very different from that of the epidemic cholera which is now (1832) displaying its ravages in Great Britain and France. It is reported to have broken out in September 1780, and to have become very general in the crew of the *Atlas* East Indiaman, whilst that ship was sailing from Malacca to Canton. When the ship left Malacca, there was no epidemic disease in the place; when it arrived at Canton, it was found that at the very time when they had the influenza on board the *Atlas* in the China seas, it had raged at Canton with as much violence as it did in London in June 1782, and with the very same symptoms. In October and November 1781 it appeared in the East Indies, and was said to have attacked the British army while it was besieging Negapatam in November 1781. Its progress is stated by Webster to have been from Siberia and Tartary westward. At Moscow it prevailed in December 1781; at Petersburg in February 1782; and it was traced to Tobolski. It was in Denmark in the latter end of April. From the shores of the Baltic it spread to Holland and the Low Countries, and thence to England. London was said to be attacked sooner than the west and north; Ireland a few weeks later, and the south of Europe later still; for it prevailed in France in the months of June and July, in Italy in July and August, and in Portugal and Spain in August and September; seldom continuing longer than six weeks in any place.‡

The influenza of the spring of 1803 afforded

an occasion for collecting a great number of notices from different parts of the country on the subject of this epidemic. The London Medical Society set a laudable example by proposing a set of queries to its corresponding members in a circular letter; and the sixth volume of "*Memoirs*" contains reports from nearly sixty practitioners in England, Scotland, and Ireland, as to the date of its first appearance, its symptoms, treatment, &c. in their respective neighbourhoods. Dr. Beddoes also interested himself very zealously on the same occasion, and procured various testimonies from his friends and others, which, to the number of one hundred and twenty-four, are inserted in the ninth and tenth volumes of the "*London Medical and Physical Journal*." These documents contain a mass of very useful information. This epidemic was observed at Paris and in other parts of France and in Holland some weeks before it appeared in London; and Dr. Bardsley says "the same length of time was occupied in its progress from the latter city to Manchester."§ Its course seemed to be from S. to N. It was in Cork and Dublin before it reached the north of Ireland, immediately after a S.E. wind. An epidemic ophthalmia followed it in France,† and a severe dysentery, such as had not been known for thirty years, in some parts of the United States, which it visited the same spring.‡ It was observed to be epidemic in Sussex, and some of the counties in the S.W. as early as February; in Shropshire, Nottinghamshire, &c. in March; in Yorkshire and Lancashire in April; and at Sunderland in May.§ It was evident that there was a degree of progressive movement northward, by marking the time when it was at the height in each place; yet many of the accounts above alluded to inform us clearly that sporadic or solitary cases exhibiting the true characters of influenza, occurred in several places long before the disease became established, so as to manifest a universal tendency to that form of complaints over the country, in some cases weeks before it was quite developed. It is worthy of notice that this has been remarkably the case with the epidemic cholera. Dr. Gray observes that, in 1782, a complaint, similar to the influenza, was taken notice of in some parts of the kingdom several months before that disorder made its progress through it.||

The influenza of last year (1831), though generally mild in its character, was almost universal; for it would seem to have prevailed in both hemispheres in the same year. Accounts have been received of its appearance in India as well as in the United States of America.¶ In many places it has been the precursor of the epidemic cholera. About a month before the latter disease broke out in Warsaw, it pre-

* *Baker*, de Catarrho, p. 33.

† Lettson's *Memoir of the Life of Fothergill*, 4to; and *Med. Obs. and Inquiries*, vol. vi.

‡ *Transactions of the College of Phys.* vol. iii., and *Med. Communications*, vol. i. Rees' *Cyclopædia*, Art. *Influenza*; and *Trotter's Med. Nautica*, i. 362. *Observations on Dis. of Seamen*, by G. Blane, M.D. p. 151.

* *Med. and Phys. Journ.* vol. ix. p. 529.

† *Dict. ut supra*.

‡ *New York Med. Repos.* 2d Hex. vol. ii. p. 141.

§ *Mem. of Med. Soc. of London*, vol. vi.

|| *Med. Commun.* vol. i. p. 6.

¶ *American Journ. of Science*, &c. vol. xxi. No. 44, p. 407.

vailed in that city.* It also swept over great part of England, Scotland, and Ireland, in the spring and autumn, and preceded the *milder* visitation of epidemic cholera which many parts of Great Britain experienced the same year. Late in the autumn it attacked Paris, the south of Spain, Gibraltar, and Italy, with more severity than it did the British islands. At Rome it was said to occasion great alarm. It has certainly skipped over many countries of Europe in its march from Poland to France through England, so far as we can judge negatively from the want of official reports; but, with this exception, it has pursued a course not widely different from that of similar former epidemics, and has proved to be a true herald of the epidemic cholera in many places.

II. The influenza does not seem to have exhibited a greater variety of symptoms, in its different visitations, than other epidemics. It has varied a little in town and country, in spring and autumn, at the beginning and end of the epidemic, in different persons, and according to the particular *genius* or tendency of the epidemic constitution; but still it has maintained some prominent characteristics of its identity at different periods. The ordinary course of the disease has been marked by the following symptoms:—it usually commenced with slight chills, amounting sometimes to shiverings, and alternate flushings of heat, with languor and sense of extreme weariness; then, soreness over the eyes, or pain in the course of the frontal sinuses: these were quickly followed by frequent sneezing, a copious discharge of lymph or thin clear fluid from the nose and eyes, sometimes so acrid as to excoriate the upper lip; heat and soreness in the top of the larynx and œsophagus, and along the course of the windpipe, with hoarseness and dry cough; sense of stricture in the chest and difficulty of breathing, sometimes attended with darting pain in the muscles subservient to respiration; weight and anxiety about the præcordia, flying pains in the back, knees, calves of the legs, and various parts of the body; depression of spirits, and sudden and extraordinary prostration of strength. The tongue was mostly covered, at an early period of the complaint, with extremely white mucus, like cream—a symptom particularly noticed by Huxham, Baker, Pettit, and others: there was loss of appetite, the thirst was inconsiderable, and the pulse generally quick, weak, and soft.

The preceding symptoms appeared in various degrees and combinations, as the violence of the disease fell more particularly upon the mucous membrane, in the head, in the throat and chest, or in the stomach and bowels. When the disease chiefly affected the head, vertigo, violent headach, greatly increased by the cough, and delirium, were not unfrequent: there was hemorrhage from the nose, and pain in the ears; from which, in one case, a clear fluid was poured out like that from the nostrils.†

In some rare cases the tonsils and back part of the throat were inflamed, so that suppuration was the consequence. When the violence of the disease fell upon the lungs, as in old people, asthmatic patients, and those predisposed to phthisis, hæmoptoe was not uncommon, and frequent troublesome cough which prevented sleep. It often degenerated into pleurisy and peripneumony. In common cases the cough became loose in three or four days. The stomach was affected with nausea in many, and vomiting in some; and a spontaneous diarrhœa relieved both head and lungs, and speedily cut short the complaint. But in many instances, and in several visitations of the epidemic catarrh, a morbid determination to the intestinal canal was manifest from the beginning; which, so far from being considered a salutary effort of nature to relieve the system in that way, required especial care in the treatment, and the utmost caution in the use of purgatives. The fever was generally mild in the day-time, and it increased in the evening; and it seldom abated till some critical amendment took place by perspiration or otherwise. There was little remarkable in the urinary secretion. The duration of the complaint was from a day or two to a week or fortnight. In some, the symptoms, after abating in two or three days, returned and raged with violence. The far greater part had critical sweats about the third day, which, attended with free expectoration, banished the fever on the fifth day. One of the most remarkable features of influenza is the debility; so that many could not rise from the horizontal posture without sudden faintings, even in the stage of convalescence; and the debility often remained for a considerable time. The suddenness of the invasion, the pain and tightness in the forehead, with pain in the back, knees, and muscles, and singular prostration of strength, were thought to be distinguishing marks between the influenza and common catarrh. Indeed, the pain or soreness in the face, temples, and cheek-bones, was considered the most certain pathognomonic symptom in 1782; “and now and then was felt previously to the catarrh, and not unfrequently was followed by very little or no catarrhal affection.”

In one district in Gloucestershire, a practitioner states that “in no two persons in 1803 did he observe precisely the same symptoms.”* If this was the case, the symptoms might be expected to vary considerably in different places, as well as in different visitations of the distemper. And this has happened accordingly. The rarer occurrences were, an unusual disposition to sleep, stranguy and bloody urine independent of blisters, *peculiar slow and strong pulse*, with excessive debility, as at Newark; ringing in the ears and abscess, and abscess in the frontal sinus; of which last Dr. Rush had three cases in 1790.†

* Med. and Phys. Journ. vol. x. p. 309.

† Brierre de Boismont sur le Cholera, p. 110.
† Med. Trans. of the College of Physicians, vol. iii. p. 69.

† Trans. of Col. of Phys. iii. 68, and Rush's Med. Inquir. ii. 354. Mem. of Med. Soc. vol. vi. p. 383.

The duration of influenza in any one place seldom has exceeded six weeks. Upon the whole few have died of this complaint, although it has often attacked more than one-half or even three-fourths of a whole community. The chief victims have been the aged and asthmatic, those of tender lungs and of full oppressed habits. Those of middle age were more liable to be affected than old persons and children; and persons exposed to the air than those who were confined. Many recovered their strength very slowly, and some, especially in 1762, fell into incurable consumption.

III. One general observation seems to apply to almost every epidemic disease, including even those of a pestilential nature, viz. that during its prevalence numbers are attacked in so slight a manner as to require but little medical care. Hence the influenza, which in all its visitations has had a favourable character in the majority of cases, has been easily removed by mild diluents, rest, and abstinence for a few days from animal food and fermented liquors. Besides this, a complaint so various not only in its symptoms but in the degrees of their intensity, modified too at different periods by season, climate, and epidemic constitution, would of necessity call for the exercise of much discretion in the employment of remedies. But, making due allowance for all this variety of character in the complaint, and for the judicious adaptation of a corresponding treatment, physicians of eminence, in different countries, seem to have agreed remarkably in their testimony as to the general rules and principles of their practice; and from the very beginning of the sixteenth century, in their reports, with respect to bloodletting, to the caution about active purgatives, to the employment of a cold regimen, and to the restricted use of opiates, there is a very striking and satisfactory coincidence.

In the mild attacks of the disorder, few if any medicines have been required. In severe cases, emetics at the beginning relieved the sufferings of the head and chest, and, combined with gentle aperients and antimonial or saline medicines, were found useful in mitigating the fever and promoting a salutary diaphoresis.

No observation is to be found more general in practical writers in this disease than that bloodletting could rarely be employed with safety, far less with benefit, on account of the alarming debility and weakness of the pulse; and when it was strongly indicated, practitioners were sparing in the quantity of blood, and cautious in repeating the remedy. In the epidemic of 1510, Dr. Short tells us that "bleeding and purging did harm." In 1557, bleeding was said to be so fatal, that in a small town near Madrid two thousand persons died after it in September. In 1580, Sennertus ascribes the death of two thousand persons in Rome to venesection, and states that, where it was omitted, the mortality was not greater than one in a thousand. "*Experientia enim hoc comprobavit, omnes fere mortuos esse, quibus vena aperiatur.*" Forestus, in his Scholia

on the same epidemic, suggests a good practical hint, that we ought to distinguish very carefully those cases which might require, from those which might not bear this remedy. Huxham, who had no prejudice against bloodletting, remarks, "*Imo, si vel peripneumoniae aliquid subsesset, minime largam, sine maxima virium ruina, plus vice simplici venesectionem tolerabat: nec in hac solum, sed in omni febre catarrhali epidemica hoc fere perpetuum notavi.*"* In Edinburgh it was noticed that those who were bled, in 1733 and 1782, "recover more slowly;" though others at the commencement seemed to be relieved by the lancet.† In the influenzas of 1733, 1775, and 1803, in France, bloodletting was generally injurious.‡ Dr. Glass reports that at Exeter, in 1775, venesection "weakened the patient without relieving the pain;" and Dr. Ash considered that "it was never necessary to bleed at Birmingham; that in a neighbouring town, three died who were bled, and all recovered who were not bled."§ Dr. Gray gives it as a general inference from the accounts transmitted to a "Society of Physicians" in 1782, "that bloodletting was by no means conducive to the general cure of the disease."|| Many physicians bear testimony to the same good rule of practice in the influenza of 1803, as Dr. Bardsley of Manchester, Dr. Kinglake of Taunton, Dr. Rutter of Liverpool, and others.¶ Notwithstanding the foregoing authorities, it is admitted by some eminent physicians, that cases now and then occurred in which this remedy was useful. Sir George Baker made this observation in 1762, in London (p. 29); and in the same city it is somewhat remarkable that in the epidemic of 1775 it was less hurtful than in other places, which was perhaps owing to the more frequent complication of the disease that year with pleurisy and peripneumony, at all times no unusual circumstance.

Opiates at the commencement of the disease almost invariably increased the febrile heat, aggravated the headach, in some cases even to delirium, tightened the chest, and stopped the expectoration; but in the decline they proved salutary. A cool temperature, both in drinks, in the air of rooms, and in the quantity of bed-clothes, was found to be useful; while, on the contrary, warm rooms, hot drinks, and cordial sudorifics, aggravated the violence of the disorder. Blisters to the chest, sides, or back, often greatly relieved the stitches and cough; and ipecacuanha was much extolled, especially in France, for its efficacy, when given in small doses, in assisting expectoration, relieving the oppressed lungs, and correcting the tendency to irritation of the mucous membrane of the bowels. A medicine often used with good effect to ease the cough when attended with viscid phlegm, was the solution of gum ammoniac combined with oxymel of squills.

* De aere, &c. ii. 102.

† Med. Essays, vol. vi. p. 29.

‡ Dict. des Sc. Méd. Grippe, pp. 356, 359, 363.

§ Lettsom's Mem. of Dr. Fothergill, 4to. p. 627.

|| Med. Com. vol. i. p. 80

¶ Med. and Phys. Journ. vols. ix. and x.

When recovery was tedious and the strength much impaired, even long before the cough was removed, some bitter infusion, such as that of calumba, cascarilla, or Peruvian bark, with wine-why and some nutritious diet, was of great service. The reason why purgatives have been so generally reprobated by practitioners in the influenza, appears to have depended on the fact, that a morbid state of the mucous tissue of the internal surfaces exposed to the air, was often closely connected with a morbid tendency in that of the alimentary canal; and, therefore, drastic purgatives, though they might relieve one system or set of organs, yet too often only transferred the disease, as it were, to another, and produced a dangerous debility.

IV. Amongst the phenomena relating to the weather, which seem to have had a connection with epidemic catarrh, either as precursor or attendant signs, we may notice extraordinary vicissitudes, easterly winds, thick or offensive fogs, and diseases, often of a similar kind, among horses, dogs, and cattle. Epidemic catarrh is a disease either of spring or autumn. The spring influenzas have sometimes occurred when the first heat suddenly followed the winter's cold; and the autumnal, when the cold moisture and raw fogs of November have succeeded to the heat of a dry harvest; yet there has not been a uniform connection between any one sensible quality of the atmosphere as to heat or cold, rain or drought, wind or calm, and the prevalence of this epidemic; for in different places it has maintained itself under the dominion of each of these states of the weather, "et tempori frigidiori et calidiori, et flante tam austro quam Borea, et pluvioso et sereno cœlo, peragravit hasce omnes Europæ regiones, et omnia loca indiscriminativim."* In fact, extraordinary vicissitudes have been more remarkable than any thing else: in some places, one peculiar sign of atmospheric intemperature has been observed, and in other places a different sign; and the epidemic has frequently fallen capriciously or partially, like the blight over a country, or even over a garden.

Short says that "thick, ill-smelling fogs preceded, some days, the epidemic catarrh of 1557. July, August, and September had been very hot and dry; and in the end of September came a very strong cold north wind."†

Riverius, quoted by Saillant in his History of Catarrhal Epidemics, says that just before that of 1580 appeared in France, (at Nismes or Montpellier?) "a prodigious quantity of insects appeared in April and May; and the roads were covered with them in such a manner, that a person in walking might have destroyed them by thousands."‡ And Petrus Salius Diversus, cited by Dunning, tells us of the birds and brute animals suffering generally

the same year.* To these facts we may add the observation of Short, that "after a long continuance of hot, moist weather, attended with southerly winds, at the rising of the dog-star came a cold, dry, north wind; and from the middle of August to the end of September raged the malignant epidemic catarrh."† Great extremes of the weather preceded the epidemic catarrh of spring 1658, described by Willis;‡ and Sydenham attests that "the epidemic catarrh of autumn 1675 immediately succeeded cold and moist weather, which suddenly followed an unusually warm summer."§

We have no very particular account of the state of the weather in England attending the epidemic catarrh of autumn 1729; but Hoffmann does not hesitate to ascribe its origin in Germany to the uncommon "irregularity and frequent changes of the weather from heat to cold and from cold to heat, &c. which distinguished that and the preceding year, such as he had never before witnessed; causing throughout all Germany, Belgium, England, and elsewhere, unusual sickliness: "tam uberi proventus enati fuerint morbi, quam vix alio tempore visum unquam."||

Within the last century the number of observations on the phenomena in question increases very considerably; and we are thus enabled to make some approximation to general principles. Saillant's excellent work,¶ on the continent, and the facts which have been collected in this country, on the catarrhal epidemics of 1775, 1782, and 1803, afford us much assistance in this inquiry.

De Jussieu says that "the influenza of spring 1733 appeared in France immediately after offensive fogs, *more dense than the darkness of Egypt*," (plus épais que les ténèbres de l'Égypte.***) Huxham remarks generally that the cause of epidemic catarrh seems to depend on a thick, moist, and cold air; and that in the autumnal months preceding the spring catarrh of 1733, epidemic diseases were very common and fatal among horses.†† We find, also, that about Edinburgh coughs and running from the nose in horses were universal in October and November, just before the disease attacked men.‡‡

The influenza of spring 1743 was the precursor of the great plague in some parts of Sicily. In England it was not so severe and fatal as in some other parts. About Plymouth, according to Huxham, many horses were diseased, and deer perished in January.§§

Sir G. Baker says that the weather in spring 1762, before the epidemic catarrh of that year

* Med. and Phys. Journ. x. 143.

† Hist. &c. i. p. 260.

‡ Ibid.

§ Syd. Opera, sect. v. ch. 5.

|| Hoffmann, Op. tom. ii. pp. 83, 109.

¶ Tableau des Epidémies Catarrhales, depuis 1510, jusque celle de 1780.

*** Dict. Art. Grippe.

†† De aere, &c. tom. i. pp. 73, 75.

‡‡ Med. Essays, ii. p. 31.

§§ Webber's Hist. i. 386; and Huxham, op. cit. ii. p. 95, &c.

* Salus Diversus, cited by Dunning, Med. and Phys. Journ. x. p. 143.

† History, &c. vol. i. p. 223.

‡ Dict. des Sc. Méd. tom. xix. p. 359.

broke out in London, was extremely irregular; wind, frost, snow, and rain following each other in rapid succession, and with unusual severity. In April and May intense heat followed; and besides this, the air underwent very sudden changes from heat to cold and from cold to heat.*

A hot dry spring and summer preceded the epidemic catarrh of autumn 1775. Petit says that in France the disease was ushered in by thick noisome fogs ("brouillards fétides"), and a cold rainy autumn.† Dr. Anthony Fothergill says that disease among dogs and horses was general over England before the influenza broke out;‡ and we are also assured that it was preceded by foggy air as well as by disease among dogs and horses in Dorsetshire, and at Exeter; and by unusual haze, easterly winds, and almost universal cough among the horses in North Wales.§ About the 7th of October, 1775, it appeared in the shire of Galloway in Scotland; "and a continual dark fog and particular smoky smell in the atmosphere prevailed for five weeks, the sun was seldom seen, and though October and November are particularly rainy months in that country, little or no rain fell, the wind E.S.E. and S."||

With regard to the influenza of spring 1782, "the spring of this year was remarkably late, with a long prevalence of cold easterly winds; the hedges were not full blown in Cornwall before the beginning of June. A similar state of weather has commonly ushered in this universal malady."¶ Dr. Hamilton tells us that "from the first of January till the end of May, throughout most places in the kingdom, the weather was uncommonly unfavourable;" and it appears that the latter month "was remarkable in all the meteorological annals of Europe for its unusual degree of cold and humidity, with a gloomy and uncommonly disturbed state of the atmosphere."*** Dr. Darwin adds his testimony, that in this year (1782) "the sun was for many weeks obscured by a dry fog, and appeared red as through a common mist;" and he supposes, "the material which thus rendered the air muddy, probably caused the epidemic catarrh which prevailed in that year."†† Dr. Parr says that horses were affected with a cold at the same time, near Exeter.‡‡ Maertens records a striking fact relative to the first appearance of this epidemic at Petersburg, and its connection with a particular change of the weather: "On a cold night the thermometer rose 30° of Fahrenheit; the next morning forty thousand people were taken ill with the influenza."§§

The influenza of spring 1803, as we have

said, afforded an occasion for the collection of many valuable observations. It appeared in France some weeks before it invaded this country, and was supposed to be owing to a cold and humid autumn succeeding a dry and hot summer. At Paris it was immediately followed by a severe epidemic ophthalmia, about the time the influenza first appeared in Britain.* With respect to unusual extremes in the weather, such are stated to have occurred in Hampshire, London, Somersetshire, and St. Andrews in Scotland.† "I am of opinion," says Cuming, (Romsey, Hants,) "that the remote causes of this disease originated in the sudden change of atmosphere, a change, I believe, generally felt throughout the United Kingdoms, as well as upon the continent." Epizootic diseases preceded it, in some places among one or two species of animals only, in others among several, as cats, dogs, horses, cows, sheep, swine, in Shropshire, Worcestershire, Staffordshire, Cumberland, Hampshire, Lancashire, &c.‡ At Plymouth "many attributed the disorders among the horses to their having eaten insects, which for many weeks were innumerable, and covered the fields in a most extraordinary manner wherever there was any length of grass; and this, from the mildness of the season, was general in almost every field."§

Disease was very prevalent among sheep in some parts of the north of England, last spring (1831), just before the influenza appeared; and an epidemic catarrh seems to have raged among horses in the south later in the year. The influenza of this year was remarkable for this, that it prevailed in some parts of Great Britain in spring, and in other parts in autumn. Its character was generally mild in all. With regard to the weather, an intelligent captain of a regular trader in the English channel declared to the writer of this article, that for thirty years past he had no recollection of such a long continuance of a thick and foggy atmosphere, as he has had occasion to observe within the last eighteen months, between this country and the south of Ireland. He went so far as to state that he had scarcely made one clear passage from Liverpool and back again during this whole period.

One general inference offers itself to our notice on reviewing the foregoing facts, viz. that no particular phenomenon in nature universally characterizes the epidemic constitution which precedes, or that which accompanies the disease called influenza; and we are led to conclude that the causes of this epidemic, supposing them to take their rise in atmospheric changes of a universal nature, are far from being marked by uniformity in the signs. At the same time we are bound to admit that the changes from warm weather to cold, and

* De Catarrh. Epid. p. 7.

† Art. Grippe, Dict. p. 359.

‡ Mem. of Med. Soc. vol. iii. 36.

§ See the Reports of Drs. Pulteney, Glass, and Haygarth, in Lettson's Life of Fothergill.

|| Mem. of Med. Soc. vol. vi. p. 323.

¶ Trotter's Med. Naut. vol. i. p. 362.

** Mem. of Med. Soc. vol. ii. p. 433 and 445.

†† Zoonom. c. ii. l. 3.

‡‡ Med. Comment. vol. ix. p. 414.

§§ Med. and Phys. Journ. vol. x. p. 524.

* Dict. ubi supra.

† Med. and Phys. Journ. x. 313, and Mem. of Med. Soc. vol. vi.

‡ Ibid. pp. 288, 379, 316, 414, 426, 444, 482, 576.

§ Med. and Phys. Journ. x. 137.

from cold weather to warm, with dampness, fogs, and easterly winds, have rarely been absent from the catalogue of natural indications. Disease among domestic animals is also to be noted as a very common precursor in many places, and in several distinct visitations of the influenza.

V. The influenza, like every other epidemic disease, has given occasion to medical observers to entertain very opposite views on the question of its contagious property. Were we to draw a general inference from the recorded statements of the majority, we should say that it was *not* contagious; for the numbers who have given an opinion on this side far exceed the advocates of contagion. But we must not appeal to the majority in order to decide a principle in science. It must, however, be acknowledged, that while individual or partial occurrences might lead to the supposition that influenza was propagated in many instances by contagious transmission, a comprehensive survey of facts goes far to establish the contrary opinion; for some things can hardly be explained on the principle of contagion without having recourse to suppositions that could not be warranted by a sound induction. Upon the whole it would appear that some general cause, if not originating, at least subsisting in the atmosphere, and depending on its changes, progressive also in its movements from place to place and from country to country, gives rise to the disease; but that it is probable that a limited propagation *also* takes place by personal intercourse, *under the influence, and during the prevalence, of the epidemic constitution.*

We have writers affirming that persons who have been visiting or on business in an *infected* town, have been the first to introduce the epidemic into their own town or neighbourhood; and it cannot be doubted that the members of a family and the inhabitants of a district have often been attacked by the influenza in *succession*. Hence these things would seem to indicate that the disease was propagated by contagious transmission more than by some universal medium. But the difficulty of proving the first to be actually the case, must, in the nature of things, be very considerable; for it would appear,—and the remark applies to almost every epidemic disease,—that in many places a tendency to the epidemic has been recognized by clear indications some time *before* the peculiar combination of symptoms which characterize it have shewn themselves, making the moment of actual invasion very doubtful; just as, it is well known, the epidemic imprints its own character for some time *after* upon the diseases that follow it. And though no *epidemic* disease with which we are acquainted is so sudden and simultaneous in its attacks as influenza, and therefore none more emphatically deserves the name of *epidemic*, nor more decidedly proves a universal cause; yet it is a striking fact that, with all its frequent rapidity of movement over the globe, it has in almost every country been more or less obedient to the laws which govern other epidemics, according to some *progressive* and *consecutive* operations that are as much

hidden as the efficient cause of attraction. It does, in fact, mostly observe some progressive law in moving over a country and in attacking a given multitude of people, which demonstrates that, however universal may be the cause of an epidemic disease in its purest form, yet if we regard experience, the effects rarely if ever should be expected to appear without some degree of consecutive order. The difference of constitution, of age, of habits, of locality, and of other things, may be quite sufficient to account for the phenomenon of successive attack; and, indeed, it is what we might expect a priori. If to this we add the probability, and, indeed, necessary inference from the facts, that the cause itself is developed gradually, we shall have less difficulty in accounting for a continuous mode of attack on another principle than that of contagion.

Though a successive mode of propagation over a country or city is most usual, yet on some occasions the spread of influenza over a whole kingdom, within the space of a few days, has been so general as to make the propagation by means of personal intercourse quite incredible, and almost impossible. Besides this, its sudden appearance in ships at sea, which have had no intercourse with land or with other vessels for a considerable time, can hardly be explained on any other supposition than that of its atmospherical origin. Dr. Anthony Fothergill assures us that “both the epidemics of 1758 and 1775 seized whole families on the same day, often remote from one another, and without any intercourse.”* Again, “the influenzas of 1775 and 1782 seized some persons at sea, while others were attacked on shore, and that without any perceptible communication.”† “The appearance of the influenza in 1803 in England,” according to Dr. Woodforde, “was very sudden, and its attack extremely general, so that it is difficult to say in what or in how many parts of the kingdom it prevailed at first. It is probable that the disease broke out in all at or nearly the same time.”‡

The following fact is very conclusive as to the operation of some general cause; for it is scarcely probable that contagion could be lurking a long time before, and then should burst forth at the same time at distant points in so remarkable a manner. Two separate fleets left the coast of England for different points of destination in the year 1782; one, under Admiral Kempenfeldt, on the 2d of May, to cruise between Brest and the Lizard; the other, under Lord Howe, on the 6th of the same month, for the Dutch coast: neither fleet had communication with any shore; and the crew of each was perfectly healthy on sailing from Spithead. But on the 29th of the month, near four weeks after, the crew of the *Goliath*, one of the ships under Kempenfeldt, was attacked with influenza, and about the same time the epidemic appeared also in the *Rippon*, under Lord Howe. The other ships of both fleets were attacked in suc-

* Memoirs of Med. Soc. vol. iii. p. 36.

† Ibid. 38.

‡ Med. and Phys. Journ. vol. ix. p. 505.

cession. In fact, so many men of both squadrons, on these remote stations, were rendered incapable of duty, that all were obliged to return to Portsmouth about the second week in June.*

If we pay attention to the course or direction of the several visitations of the influenza, we may observe that its general progress is not without some order. It either follows a westerly course, or one from the south towards the north. If its course be westward, it does not usually take extensive leaps over kingdoms, and then return to those it may have missed, as would be likely to happen if nothing more than personal intercourse and the various casualties of travellers' routes exerted an influence in determining its course. But it sweeps along the north from the east through Russia, Poland, and the north of Germany to England; and then wheels round through France and Spain to Italy. And here we cannot but trace a striking resemblance to the career of the epidemic cholera. But if influenza arises in the south, it takes a course from Italy through Spain, France, Britain, and the Netherlands, along the shores of the Baltic. In the one case France is attacked before England, in the other after it.

Were we to admit that the propagation of an epidemic disease over a space of some hundred square miles in the course of a few days or weeks might be accounted for on the doctrine of contagious transmission by means of travellers and the facilities of human intercourse, analogy might supply us with an argument against the admission; for in the case of some of the domestic animals, which do not travel from country to country like man, but are comparatively stationary, epidemic diseases are observed to spread among them, sometimes in as extensive and simultaneous a manner as amongst human beings.

VI. The facts we are now to notice seem to afford strong indications of the influence which the general cause that produces epidemic catarrh exerts over the human body with regard to other diseases; and so far they are opposed to the theory that contagion is the cause of it. Webster has remarked that catarrh or influenza is the disease which is most clearly connected with pestilence in the form of malignant angina, dysentery, yellow fever, and plague, which it usually precedes.† This observation is partly confirmed by subsequent experience. These facts also show how the general cause is controlled or modified by local peculiarities, as well as by constitutional varieties.

Sir George Baker tells us, that "while the influenza of 1762 was prevailing in a very mild and tractable form in the villages near Lincoln, that were high and exposed, quinsies, pleurisies, and peripneumonies produced incredible destruction of life in the low neighbouring districts.‡"

Dr. Carrick of Bristol says that "one of the most open and exposed of the buildings on Clifton Hill is Richmond Terrace, which forms three sides of a parallelogram, fronting respectively the east, south, and west. On the east side, not one family, scarcely an individual, escaped the complaint (in 1803), while on the south side a great majority both of persons and families, in all other respects similarly circumstanced, escaped it entirely."*

Dr. Binns states that at the time the scarlatina existed at Ackworth School in 1803, the influenza prevailed in the neighbouring towns; yet that the latter did not attack a single individual of the family at the school, consisting of between three and four hundred persons.† Burton-on-Trent, also, in great measure escaped the influenza the same year; and scarlatina, with whooping-cough and measles, were epidemic there in its place.‡

"In London the influenza of 1803 superseded or deferred the usual diseases of the spring, as the measles and scarlatina; this is also recorded by Lorry to have been the case in the epidemic catarrh that prevailed in France in 1775; but he adds, that during the summer these complaints appeared with more than usual violence and fatality."§

"At Aberdeen the influenza of 1775 began near the end of November, and continued four or five weeks, but did not visit Fraserburg, where there was a putrid fever very fatal at that time."|| At Chester, according to Dr. Haygarth, "the same epidemic, in 1775, attacked many who were confined to their houses and even to their beds with other ailments."¶

Dr. Vaughan says that at Rochester, when the influenza of 1803 ceased, "an exanthematous fever prevailed, which did not appear to attack any except those whom the influenza spared."***

Dr. Gibney reports that "at Navan in Ireland, after the influenza of 1803, a low fever, almost constantly prevailing in that town, disappeared for a considerable time."††

Dr. Currie states that "at Holywell, a populous town eighteen miles from Chester, and where there is a large cotton manufactory, a typhous fever of uncommon malignity had prevailed for a considerable time: the manufacturers and inhabitants of the town had not been free from it for more than two years. On the appearance of the influenza in the spring of 1803, the typhus entirely ceased, and only one case of fever has occurred since (nearly three months). I have not for many years known this country so healthy as since the influenza disappeared."‡‡

Dr. Rush remarks that, during the prevalence of the influenza at Philadelphia, he saw no

* Young's Med. Literature, p. 575. See also Mem. of Med. Soc. vol. vi. p. 345.

† Ibid. p. 351.

‡ Ibid. p. 405.

§ Ibid. p. 520.

|| Lettsom's Mem. of Fothergill, p. 642.

¶ Ibid. 637.

*** Mem. of Med. Soc. vol. vi. p. 589.

†† Med. and Phys. Journ. vol. x. p. 527.

‡‡ Ibid. p. 214.

* Transactions of the Col. of Phys. vol. iii., and Trotter's Med. Naut. vol. i. 364.

† See Hist. of Epid. vol. ii. p. 39 and 48.

‡ De Catar. Epid. p. 19.

sign of any other epidemic, and that the scarlatina anginosa, which prevailed during the summer, disappeared after the 1st of October, but appeared again after the influenza left the city. It blended itself with every species of chronic complaint.”*

“The influenza was the precursor of the malignant yellow fever, which, commencing in the beginning of September, 1802, at Fort Royal and St. Pierre’s, Martinique, among the French seamen and soldiers lately arrived from France, committed the most frightful devastations amongst them.”†

“During the prevalence of influenza at Vienna, from December 1788 to May following, there were scarcely any instances of real pleurisies or peripneumonies, though these often appeared during that season in former years.”‡

Dr. Chisholm mentions the exemption from the severe influenza of 1789 in its malignant form, after a remarkable change in the weather, of some estates in the island of Grenada, which had been attacked by it in its milder character before the change took place.§

While the influenza of 1762 was in London, peripneumony and angina were unusually and almost universally prevalent in the country;|| and Dr. Carmichael Smyth relates, that “although the epidemical catarrh of 1782 quickly disappeared in the metropolis, it seemed to leave behind it an epidemical constitution which prevailed during the rest of the summer: and the fevers even in the end of August and beginning of September assumed a type resembling in many respects the fever accompanying the influenza.”¶

After the disease had continued some weeks, it was observed to change its character in several places. In Dublin, Dr. Cleghorn remarked that the fever with which the influenza of 1782 was accompanied, became remittent, and sometimes intermittent; in Lincoln it was intermittent, at Stamfordham and the Isle of Man, “low and putrid.”**

We can scarcely look over the histories of influenza without perceiving a connexion between this disease and morbid affections of the mucous surface of the stomach and intestines. Thus Huxham has recorded the frequent appearance of cholera and diarrhoea in July, September, and October, after the spring influenza of 1733.†† The same author describes the “dysentaria cruenta epidemica,” which raged at Plymouth and the adjacent country, both before and after the influenza of 1743: and he adds that “he did not know whether the former disease might not be considered a translation of the latter to the intestines; but he had observed that epidemic dysentery was very rarely to be met with in the spring.”‡‡

* Rush’s Med. Inquiries, vol. ii.

† Mem. of M. S. vol. vi. p. 599.

‡ Dr. Carenus, Med. Comment. vol. xvi. p. 161.

§ Med. Com. vol. xv.

|| Sir G. Baker, de Cat. Epid. p. 18.

¶ Med. Com. vol. i. p. 71.

** Med. Com. vol. i. p. 25.

†† De Aere, &c. vol. i. 86 and 88.

‡‡ Ibid. ii. 99, 103.

Sir George Baker follows up his account of the epidemic catarrh of 1762 in London with a description of the epidemic dysentery which immediately succeeded it in that city;* and both he and Dr. Reynolds remarked that in 1775 diarrhoea sometimes followed the attack of influenza.†

Dr. Hamilton states that in the neighbourhood of Newcastle-upon-Tyne, “the influenza of 1782 was accompanied with colic pains and cramps in the region of the abdomen and stomach, and some had purging.”‡

In France, in the influenza of 1803, “gastric irritation was one of the most frequent complications of the disorder, and appeared in some measure to constitute an essential part of it.”§

Dr. Bertram of Hull remarked that some of the attacks of influenza in 1803 nearly resembled cholera morbus, others cynanche tonsillaris; and he goes so far as to express “a firm conviction of the three diseases being different types of the same disorder, and occasioned by the same cause.”||

Diarrhoea seems to have preceded, as an epidemic, the influenza of 1803, at Plymouth Dock, as in 1743 and 1788; for Dr. May says that early in the year “diarrhoea and cholera were very prevalent; so nearly similar to that preceding the influenza of 1788, that to many of his friends he hazarded a pretty confident opinion of an expected return; and in this he was not deceived.”¶

It must be fresh in the recollection of most that the epidemic cholera, which in a milder character appeared in many parts of Great Britain last year (1831), and is now running so fatal a career in its malignant type, was preceded by the influenza; and we know that the same herald of that formidable epidemic was seen also at Warsaw, Paris, and other places; and was lately announced even in the United States of America a short time before the cholera made its appearance in the transatlantic cities.

These facts are collected to show that there is a closer connexion between some epidemic diseases, both as to their affinity and their causes, than we commonly imagine; and that it is only by a very enlarged view of their phenomena in different countries that we can hope to improve our knowledge in this obscure branch of science.

(Thomas Hancock.)

INSANITY.—SECT. 1.—Remarks on attempted definitions of insanity.—Different varieties of the disease referred to three principal forms.

Writers on insanity are generally agreed as to the difficulty of inventing a satisfactory definition of that disease. It is perhaps impossible to comprise in a few words a charac-

* Opus cit.

† Mem. of Fothergill, supra cit.

‡ Mem. of Med. Soc. vol. ii. p. 435.

§ Dict. des Sc. Méd. Art. Grippe, p. 362.

|| Mem. of Med. Soc. vol. vi. p. 332.

¶ Med. and Phys. Journ. x. p. 291.

teristic description of mental derangement which may prove to be of practical use; and it is not an easy matter to discover one that even includes all the essential features of the object which it is proposed to define. The latter of these requisites will be obtained if we describe insanity as consisting in "a disordered state of the functions of the brain, which gives rise to disturbances in the operations of the mind." This definition may correctly be applied to madness, but it also includes a variety of other diseases; and hence it becomes necessary to render the description more particular by exclusions and restrictions. It must be added, for example, that the disturbance in the mental operations ensuing from the morbid cause in the brain is not allied to coma or to loss of consciousness and sensibility, in order to exclude from the definition apoplexy and disorders of the same class. For a similar reason it has been common to observe that madness is a species of delirium distinct from that which is symptomatic of typhus and other febrile diseases. There are some other morbid states of the brain and of the faculties dependent for their exercise on the functions of that organ, which must in like manner be excluded by express limitations. Such are congenital idiotism, and the imbecility of old age. Now it is obvious that a definition loses all its utility when it is found necessary to encumber it with so many particular restrictions, and it is therefore better to give up the attempt to define insanity in general terms.

But the practical purpose of a definition, which is to give a clear and distinct conception of the thing to be described, will be secured if we can determine and classify the various disturbances which the mental operations undergo. These disturbances, however, present very different phenomena in different instances of the disease, and we cannot attempt to draw up a concise account of them until we have briefly noted their principal varieties.

It is generally supposed that the intellect or the reasoning faculty is principally disordered in persons labouring under mental derangement. Mr. Locke made a remark, that "madmen do not appear to have lost the faculty of reasoning; but having joined together some ideas very wrongly, they mistake them for truths, and they err as men do that argue right from wrong principles." From Mr. Locke's time it has been customary to observe that insane persons reason correctly from erroneous premises; and some instances of hallucination, or some particular erroneous impression, have been looked for as the characteristic of the disease, or an essential circumstance in it. Dr. Cullen seems to have had Mr. Locke's observation in his mind when he laid down the definition of madness which occurs in his First Lines. He describes this disease to be "in a person awake a false or mistaken judgment of those relations of things which, as occurring most frequently in life, are those about which the generality of men form the same judgment; and particularly when the judgment is very

different from what the person himself had before usually formed." Cullen attempted to draw even this description within narrower limits, by observing that "there is generally some false perception of external objects, and that such false perception necessarily occasions a *delirium* or *erroneous judgment*, which is to be considered as the disease." That this is by far too limited an account of madness, and only comprises one, and that by no means the most frequent form of mental derangement, every person must be aware who has had opportunities of extensive observation.

Of those lunatics whose intellectual faculties are manifestly disordered, there is always a considerable proportion in whose minds it is impossible to trace any particular hallucination or erroneous perception or recollection. The rapid succession of thoughts, the hurried and confused manner in which ideas crowd themselves into the mind in a state of incoherence, or without order and connection, is in very many instances among the most striking phenomena of madness. There are, likewise, cases of a different description, in which the intellectual faculties appear to have sustained but little injury, while the feelings and affections, the moral and active principles of the mind, are strangely perverted and depraved; the power of self-government is lost or greatly impaired; and the individual is found to be incapable, not of talking and reasoning upon any subject proposed to him, for this he will often do with great shrewdness and volubility, but of conducting himself with decency and propriety in the business of life. His wishes and inclinations, his attachments, his likings and dislikings, have all undergone a morbid change, and this change appears to be the originating cause, or to lie at the foundation of any disturbance which the understanding itself may have sustained, and even in some instances to form throughout the chief character or constituent feature of the disease. The older nosologists, Sauvages, Sagar, and Linnæus, were not wholly unaware of these distinctions; for in their distributions of mental diseases, we find (besides an order of *Vesania* or *Hallucinationes*, in which erroneous impressions were supposed to affect the understanding) another department styled "*Morositates*" or "*Morbi Pathetici*," consisting of depraved appetites and other morbid changes in the feelings and propensities. The disorders, however, which are classed under these heads, are not, all of them at least, strictly forms of insanity; and Pinel appears to have been the first writer who, with a clear conception of the subject, distinguished a class of maniacal affections under the term of "madness without delirium or hallucination." Pinel, who was an acute and original observer, and whose opinions carry much weight on account of his extensive opportunities of investigating the history of madness, has made the following remark in reference to the sentiments of Mr. Locke. "We may justly admire," he says, "the writings of this philosopher, without admitting his authority upon subjects not neces-

sarily connected with his inquiries. On resuming at the Bicêtre my researches into this disorder, I thought, with the above author, that it was inseparable from delirium," (meaning what is termed by English writers hallucination;) "and I was not a little surprised to find many maniacs who *at no period gave evidence of any lesion of the understanding*, but who were under the dominion of instinctive and abstract fury, as if the active faculties alone had sustained injury."

The examples given by Pinel in illustration of the above remark were not fortunately chosen, and they are all of one kind, namely, of that in which the principal phenomena of the disease were violent fits of anger or rage. The general observation which the author has so clearly enounced, that insanity consists, in certain cases, in a morbid perversion of the affections and moral feelings exclusively, and without any perceptible lesion of the intellectual faculties, is a fact of the highest importance pathologically and practically, and the opinion of Pinel in this particular deserves the most attentive consideration. It will be found that later practical writers, though they have not made the same statement in so decided a manner, have yet given a testimony which leads to the same result. The following remarks by M. Esquirol, who is less systematic than Pinel, prove that he was led to a similar conclusion by the strict observation of facts.

"The insane conceive an aversion for those persons who are most dear to them, revile them, ill-treat them, anxiously shun them, in consequence of their mistrust, their suspicions, and their fears. Prejudiced against every thing, they are afraid of every thing. A few appear to form an exception to this general rule, in preserving a sort of affection for their relatives and friends; but this feeling of attachment, which is sometimes excessive, subsists without confidence in those persons who before the attack of disease had been the directors of the thoughts and actions of the patient. A melancholic, who is devotedly attached to his wife, is deaf to her counsels and advice. A son would sacrifice his life for his father, but will not make the slightest attempt, in compliance with the entreaties of the latter, to overcome the morbid impression which occasions him so much grief."

"This moral alienation is so constant," says M. Esquirol, "that it appears to me to be the proper characteristic of mental derangement. There are madmen in whom it is difficult to discover any trace of hallucination, but there are none in whom the passions and moral affections are not disordered, perverted, or destroyed. I have in this particular met with no exceptions."

"A return to the proper and natural state of the moral affections," says the same writer, "the desire of seeing once more children or friends; the tears of sensibility; the wish manifested by the individual to open his heart and return into the bosom of his family, to resume his former habits, afford a certain indica-

tion of cure, while the contrary dispositions had been a mark of approaching insanity, or the symptom of a threatened relapse. This is not the case when there is merely a disappearance of the hallucination, which then only is a certain sign of convalescence, when the patients return to their natural and original affections."*

If the opinion expressed by these writers is founded on real facts,—and that it is so the writer of the present article is well assured from ample proofs afforded by his own observation,—it must be evident that it leads to very important results. It will be necessary, in conformity with it, and with the varieties of phenomena which the disease really presents, to classify the different forms of madness or insanity under the following divisions.

1. Moral insanity, or madness consisting in a morbid perversion of the natural feelings, affections, inclinations, temper, habits and moral dispositions, without any notable lesion of the intellect or knowing and reasoning faculties, and particularly without any maniacal hallucination.

2. Intellectual insanity, or madness attended with hallucination; in which the insane person is impressed with the belief of some unreal event as of a thing which has actually taken place, or in which he has taken up some notion repugnant to his own experience and to common sense, as if it were true and indisputable, and acts under the influence of this erroneous conviction.

3. There is another well-marked division of maniacal cases, in which the whole mind, if we may use the expression, seems to be equally deranged. The most striking phenomena in this form of the disease are the rapidity and disorder with which the ideas follow each other, almost without any discoverable connexion or association, in a state of complete incoherence and confusion. It is impossible to fix the attention of the patient long enough to obtain a reply to the most simple question. His understanding is wholly lost in the constant hurry of ideas which crowd themselves upon him, and which appear to exceed the power of distinct utterance, while his habits betray a corresponding degree of restless activity and extravagance.

The most appropriate designation in our language for this species of disease is *incoherent madness*, a term given to it long ago by Dr. Arnold. It is named by Pinel *dementia* or *démence*, dementedness. Pinel has given an admirable definition of it: "Rapid succession, or uninterrupted alternation of insulated ideas, and evanescent and unconnected emotions; continually repeated acts of extravagance; complete forgetfulness of every previous state; diminished sensibility to external impressions; abolition of the faculty of judgment; perpetual activity."

If we are correct in assuming that all the varieties of mental derangement may find their place under one of the three descriptions we

* Esquirol, Dict. des Sc. Méd., tom. xvi.

have thus marked out, a definition or short nosography of madness will be furnished by enumerating the characteristics of the three forms. We may then describe insanity as "a chronic disease manifested by deviations from the healthy and natural state of the mind; such deviations consisting either in a morbid perversion of the feelings, affections, and habits, or in disturbances of the intellectual faculties, under the influence of which the understanding becomes susceptible of hallucinations or erroneous impressions of a particular kind; or, thirdly, in a state of mental incoherence, or constant hurry and confusion of thoughts."

We shall now endeavour to trace an accurate description of the actual phenomena of insanity, containing the results of long and attentive observation. In discriminating the different varieties of the disease, we shall neither deviate further than is necessary from the arrangements of former writers, nor shall we follow in every respect the nosological divisions which they have adopted. The reader will, if we are not mistaken, find data in the following outline sufficient to confirm and illustrate the preceding remarks, and to shew how far the distinctions we have endeavoured to establish are complete.

SECT. II.—*Phenomena of madness described.*

1. *First appearances of the disease.*—The first appearances of madness are very different in the various forms of the disease and in different cases. Sometimes the complaint breaks out at once, without any previous indications; the manners of the patient are observed to be unusually impetuous; his conversation hurried; his mind full of projects, which he pursues with restless activity. He betrays the absolute derangement of his understanding by announcing some false and absurd impression, or by acting upon it. When his attempt is resisted, or when by accident he explains the motive which incited him, his condition is at once made evident, and the necessity of restraint becomes obvious. Such is the mode in which insanity makes its attack in the greater number of cases. In other instances the actual appearance of disturbance in the intellect is preceded by a period of uncertain duration, in which an unsound state of mind exists, but displays itself in a different manner. A certain waywardness or singularity of character, an unsteadiness in pursuits and inclinations, a fickleness or capriciousness of temper and habit, is observed for some time before the individual is set down by his relatives as a lunatic. This stage of the disease may last for years. M. Pinel mentions the case of a man who believed his wife to have been deranged only six months, at the commencement of which period she had sustained an attack of violent mania, but after repeated inquiries was at length convinced that she had not been in a sound state of mind for fifteen years. The same writer likewise observes that in many instances the origin of mental derangement has been referred, on tracing its history, to a

period of four, ten, or even of fifteen or twenty years before the time when it became fully manifest, or when a disordered state, previously ambiguous, changed its character into that of ordinary or decided mania.

Cases of disease affecting the mind, such as we have described, and in which the succession of symptoms and the development of the complaint follow the order just pointed out,—a certain period either of melancholy dejection or of morbid excitement, attended with a disturbed and unnatural state of the feelings, temper, and habits, preceding, and after a time ushering in a clearly marked attack of insanity—are in fact only examples of a transition from one form or state of mental disorder to another, which is more strongly characterised and more easily distinguished. There are, however, numerous instances in which phenomena similar to those of the previous stage last for many years, perhaps during life, sometimes maintaining their ambiguous and undefined character, at others becoming aggravated in degree, but without undergoing a transition into the peculiar form of madness attended with marked disturbance of the intellectual faculties. Of this description are the cases of mental disease which we purpose to distinguish under the term of moral insanity.

2. *First form of the disease.*—*Moral insanity.*—This form of mental disease has been said above to consist of a morbid perversion of the feelings, affections, habits, without any hallucination or erroneous conviction impressed upon the understanding; it sometimes co-exists with an apparently unimpaired state of the intellectual faculties.

There are many individuals living at large, and not entirely separated from society, who are affected in a certain degree by this modification of insanity. They are reputed persons of singular, wayward, and eccentric character. An attentive observer may often recognise something remarkable in their manner of existence, which leads him to entertain doubts as to their entire sanity, and circumstances are sometimes discovered on inquiry which assist in determining his opinion. In many instances it is found that there is an hereditary tendency to madness in the family, [or that several relatives of the person affected have laboured under other diseases of the brain. The individual himself is discovered in a former period of life to have sustained an attack of madness of a decided character. His temper and dispositions are found on inquiry to have undergone a change; to be not what they were previously to a certain time; he has become an altered man, and this difference has perhaps been noted from the period when he sustained some reverse of fortune, which deeply affected him, or since the loss of some beloved relative. In other instances the alteration in his character has ensued immediately on some severe shock which his bodily constitution has undergone. This has been either a disorder affecting the head, a slight attack of paralysis, a fit of epilepsy, or some fever or

inflammatory disorder which has produced a perceptible change in the habitual state of the constitution. In some cases the alteration in temper and habits has been gradual and imperceptible, and it seems only to have consisted in an exaltation or increase of peculiarities which were always more or less natural or habitual.

In a state such as that above described many persons have continued for years to be the sources of apprehension and solicitude to their friends and relatives. The latter in many instances cannot bring themselves to admit the real nature of the case. The individual follows the bent of his inclinations; he is continually engaging in new pursuits, and again relinquishing them without any other motive than mere caprice and fickleness. At length the total perversion of his affections, the dislike and even enmity manifested towards his dearest friends excite greater alarm. When it happens that the head of a family labours under this ambiguous modification of insanity, it is sometimes thought necessary from prudential motives, and to prevent absolute ruin from thoughtless and absurd extravagance, or from the result of wild projects and speculations, in the pursuit of which the individual has always a plausible reason to offer for his conduct, to make some attempt with the view of taking the management of his affairs out of his hands. The laws have made inadequate provision for such contingencies, and the project is often unsuccessful. If the matter is brought before a jury, and the individual gives pertinent replies to the questions that are put to him, and displays no particular hallucination,—a feature which is ordinarily looked upon as essential to madness,—it is most probable that the suit will be rejected.

Several practical writers have left a testimony, which is sufficiently conclusive, as to the existence of moral insanity, though they have not designedly and in set terms marked it as a distinct form of the disease.

We have already observed that M. Esquirol has stated his opinion to be, that moral alienation, or a perverted state of the affections, is, rather than intellectual aberration, the characteristic of mental derangement. M. Georget likewise describes the state we have alluded to as a particular modification of madness. He observes "that individuals predisposed to mental disease by a faulty education or by previous attacks, have often continued for a long time, or perhaps even during their whole lives, to attract observation by caprices in their deportment, by something eccentric in their manner and habits of life, by an ill-regulated fondness for pursuits of the fancy, and the mere productions of the imagination, combined with a striking inaptitude in the study of the exact sciences." The last-mentioned particular will scarcely be allowed to constitute a characteristic trait of madness in this country, whatever may be the case in France. "These persons are noted," continues the same writer, "for singularity of opinions, of conduct, for transitory fits of in-

telligence, or sallies of wit, which are too strongly contrasted with their habitual state of nullity or monotony; by a levity in thoughts, a weakness in judgment, a want of connexion in their attempts at reasoning. Some individuals are presumptuous, desirous of undertaking every thing, and capable of applying themselves to nothing; others are extravagant and mobile in the utmost degree in their opinions and sentiments; many are susceptible, irritable, choleric, and passionate; some are governed by pride and haughtiness without bound; a few are subject to vague anxieties or to panic terrors."

It must be observed that, although M. Georget has described this state of disease as a first stage, or as the period of what he terms with M. Esquirol the *incubation* of madness, yet, as he says that it often lasts through the life of the individual, we may consider his testimony as given, in point of fact, in favour of the real existence of moral insanity as a particular modification of disease.

Individuals labouring under this disorder are capable of reasoning or supporting an argument on any subject within their sphere of knowledge that may be presented to them, and they often display great ingenuity in giving reasons for their eccentric conduct, and in accounting for and justifying the state of moral feeling under which they appear to exist. In one sense, indeed, their intellectual faculties may be termed unsound, but it is the same sense in which persons under the influence of strong passions may generally be said to have their judgment warped, and the sane or healthy exercise of their understandings impeded. They think and act under the influence of strongly excited feelings, and a person accounted sane is under such circumstances proverbially liable to error both in judgment and conduct.

We have already had occasion to observe that the existence of moral insanity as a distinct form of mental derangement has been recognized by Pinel. The following example recorded by that writer is a characteristic one:

"An only son of a weak and indulgent mother was encouraged in the gratification of every caprice and passion of which an untutored and violent temper was susceptible. The impetuosity of his disposition increased with his years. The money with which he was lavishly supplied removed every obstacle to the indulgence of his wild desires. Every instance of opposition or resistance roused him to acts of fury. He assaulted his adversary with the audacity of a savage; sought to reign by force, and was perpetually embroiled in disputes and quarrels. If a dog, a horse, or any other animal offended him, he instantly put it to death. If ever he went to a fête or any other public meeting, he was sure to excite such tumults and quarrels as terminated in actual pugilistic rencontres, and he generally left the scene with a bloody nose. This wayward youth, however, when unmoved by passions, possessed a perfectly sound judgment.

When he became of age, he succeeded to the possession of an extensive domain. He proved himself fully competent to the management of his estate, as well as to the discharge of his relative duties, and he even distinguished himself by acts of beneficence and compassion. Wounds, law-suits, and pecuniary compensations were generally the consequences of his unhappy propensity to quarrel. But an act of notoriety put an end to his career of violence. Enraged with a woman who had used offensive language to him, he precipitated her into a well. Prosecution was commenced against him, and on the deposition of a great many witnesses, who gave evidence to his furious deportment, he was condemned to perpetual confinement in the Bicêtre."

The morbid and irregular excitement of the active propensities, and the total want of self-control, which are so conspicuous in moral insanity, display themselves in various ways. Almost every passion or feeling of the mind gives in different cases the character to the disease when displayed under a certain modification which it would not be easy to describe in accurate terms. Violent gusts of passion breaking out without cause, and leading to the danger or actual commission of serious injury to surrounding persons, are the features of disease in most of the cases mentioned by Pinel. These were examples of madness, consisting in intense irascibility without lesion of the understanding. There are other instances in which malignity has a deeper die. The individual, as if actually possessed by the demon of evil, is continually indulging enmity and plotting mischief, and even murder, against some unfortunate victim of his malice. When this is connected with the false belief of some personal injury actually sustained, the case does not fall under the head of moral insanity simply so termed. It involves hallucination or erroneous conviction of the understanding. But when the morbid phenomena include merely the expressions of intense malevolence excited without ground or provocation, actual or supposed, the case is strictly one of moral madness. And such instances are more frequent than it will be easy for many persons to believe.

Some maniacs display their condition by a propensity to commit every species of mischief, though devoid of any feeling of malevolence. A case of this description, strongly marked, was lately pointed out to the writer of this article in the York Lunatic Asylum, by Dr. Wake, the able and intelligent physician to that institution. The individual is a youth of good temper, cheerful and active, having no defect of intellect whatever that could be discovered, even after long observation. He is continually prone to commit every kind of mischief in his power; and not long ago escaped from his confinement and made his way to Bishop-Thorpe Palace, with the design to set it on fire. Dr. Wake has given his assurance that several cases have occurred precisely similar to that above related in all essential symptoms, during his attendance at the

asylum, which has continued seventeen years, and that he considers no point in the history of madness better established by facts than the existence of moral insanity strictly and exclusively so termed, and in conformity with the definition above laid down.

A large number of cases falling into this division of diseases are those in which a disposition to melancholy and dejection of mind exists, without any illusion of the understanding connected with it. A constant feeling of gloom and sadness clouds all the prospects of life: the individual, though surrounded with all the comforts of existence, and even, exclusively of his disease, suffering under no internal source of disquiet, at peace with himself, with his own conscience, with his God, yet becomes sorrowful and desponding. All things present and future are to his view involved in dreary and hopeless gloom. This tendency to morbid sorrow and melancholy, as it does not destroy the understanding, is often subject to controul when it first arises, and probably receives a peculiar character from the previous mental state of the individual, from his education, and his religious or irreligious character. Persons of well-regulated minds, when thus affected, express grief and distress at the inaptitude of which they are conscious to go through the active duties of life: frequently they feel a horror of being driven to commit an act of suicide or some other dreadful crime. This idea haunts them and renders them fearful of being a moment alone. It, however, subsides, and such cases often terminate in recovery. Persons of an opposite character give themselves up to *tadium vite*, to morose disgust; they loathe their very existence, and at length, unless prevented, put an end to it.

A propensity to theft is often a feature of moral insanity, and sometimes it is the leading if not the sole characteristic of the disease. The writer of this article has lately seen a lunatic, confined in an asylum, who would only eat when he had stolen food, and his keeper made it a constant practice to put into some corner within his reach various articles destined for his sustenance, in order that he might discover and take them furtively. Many instances are upon record of individuals noted for a propensity to steal, without the desire of subsequent possession, though in other respects of sound mind, or at least not generally looked upon as deranged. Probably some of these would afford, if accurately scrutinized, examples of moral insanity, while others might be found referable to eccentricity of character. The discrimination—if indeed the two things are essentially different—could only be made in particular instances by taking into the account a variety of circumstances, such as the hereditary history of the individual and his consanguinity with persons decidedly insane, his former character and habits, and the inquiry whether he has undergone a change in these respects at some particular period of his life.

This form of insanity has been, if we are not mistaken, in many instances the real source of

moral phenomena of an anomalous and unusual kind, and of certain perversions of natural inclination which excite the greatest disgust and even abhorrence.

In some instances moral insanity displays itself in a want of self-government, in a continual excitement, and unusual expression of feeling, or in thoughtless and extravagant conduct. A female, modest and circumspect, becomes violent and abrupt in her manners, loquacious, impetuous, talks loudly and abusively against her relations and guardians, before perfect strangers. Sometimes she uses indecent expressions, and betrays without reserve unbecoming feelings and trains of thought. Not unfrequently persons affected with this form of disease become drunkards; they have an uncontrollable desire for intoxicating liquors, and a debauch is followed by a period of raving madness, during which it becomes absolutely necessary to keep them in confinement. Individuals are occasionally seen in lunatic asylums who under such circumstances have been placed under controul. After the raving fit has passed off, they demand their release; and when they obtain it, at the first opportunity resort to their former excesses, though perfectly aware of the consequences which await them.

A form of mental disease has been described by some writers, which, though not of frequent occurrence, is occasionally seen, and is well known to those who have extensive means of observation. It is peculiar to old age, and has been termed *delirium senile*, and by Dr. Burrows, who has accurately distinguished it, *senile insanity*. It constitutes a variety of moral insanity.

This disordered state makes its appearance in old men who have never before been insane or suspected of any tendency to mental derangement. It consists, like other forms of moral insanity, in a morbid excitement of passions and a remarkable perversion of the temper and propensities. The whole moral character of the person is changed. "The pious," says Dr. Burrows, "become impious, the content and happy discontented and miserable, the prudent and economical imprudent and ridiculously profuse, the liberal penurious, the sober drunken." In some elderly persons impulses which had long been effete become of a sudden excited, and a strong tendency to vicious habits is displayed. "In fact the reverence which age and the conduct suited to it always command, is converted into shame and pity at the perversion of those moral and social qualities which, perhaps, have hitherto adorned the patient's declining days." This description coincides accurately with the character of moral insanity. There are instances, though rare, of the appearance of hallucinative madness in old persons, but the case we have now described is of a different character, and consists in a disordered condition of the moral or active powers alone.

The following cases will afford some observations illustrative of the history of moral insanity.

J. K—, a farmer, several of whose relatives had been the subjects of mental derangement, was a man of sober and domestic habits, and frugal and steady in his conduct, until about his forty-fifth year, when his disposition appeared to have become suddenly changed in a manner which excited the surprise of his friends and neighbours, and occasioned grief and vexation in his family. He became wild, excitable, thoughtless, full of schemes and absurd projects. He would set out and make long journeys into distant parts of the country to purchase cattle and farming-stock, of which he had no means of disposing; he bought a number of carriages, hired an expensive house ready furnished, which had been inhabited by a person much above his rank, and was unsuitable to his condition; he was irascible and impetuous, quarrelled with his neighbours, and committed an assault upon the clergyman of the parish, for which he was indicted and bound to take his trial. At length his wife became convinced that he was mad, and made application for his confinement in a lunatic asylum, which was consequently effected. The medical practitioners who examined him were convinced of his insanity by comparing his late wild habits and unaccountable conduct with the former tenor of his life, taking into consideration the tendency to disease which was known to prevail in his family. The change in his character alone had produced a full conviction of his madness in his friends and relatives. When questioned as to the motives which had induced him to some of his late proceedings, he gave clear and distinct replies, and assigned with great ingenuity some plausible reason for almost every part of his conduct. After a period of time passed in great seclusion, his mind became gradually tranquillized; the morbid excitement of his temper and feelings disappeared; he was set at liberty, and has since conducted himself with propriety.

A brother of the above patient has been at two different times confined in the same asylum, labouring under symptoms of derangement in all essential particulars resembling those above detailed. His disorder has consisted chiefly in morbid excitement, wildness and irregularity of conduct, differing from his usual habits and character, without any hallucination or disturbance of the intellectual faculties. He has on both occasions remained in the asylum until he was fully convalescent, and after his departure has acknowledged his conviction that he had been deranged, and in a state requiring control and seclusion from society.

Abraham B—, a working tradesman, of industrious and sober habits, conducted himself with propriety until about forty-six years of age, and had accumulated a considerable property from the fruits of his exertions. About that period he lost his wife, and after her death became more and more penurious. At length he denied himself the comforts, and in a great measure even the necessities of life, and became half-starved and diseased; his body was emaciated and beset with scaly eruptions. Mr. S—, a gentleman who had long known

him, hearing of the condition into which he had sunk, sent a medical practitioner to visit him, by whose advice B—— was removed from a miserable dirty lodging to a lunatic asylum. Mr. S——, who was present on the occasion, observed that Abraham B——, previously to his quitting the room in which he had immured himself, kept his eyes fixed on an old trunk in the corner of the apartment. This was afterwards emptied of its contents, and in it were found, in the midst of various articles, dirty bank notes, which had been thrown into it apparently at different times, to the value of more than a thousand pounds. Abraham B——, after his removal to an asylum, where he had wholesome food and exercise, soon began to recover from his bodily infirmities, and at length became anxious to be at large. The writer of this article visited him, and conversed with him for some time, in order to ascertain his mental condition. He betrayed no sign of intellectual delusion, nor did it appear that any thing of that description had ever been a part of his complaint. His replies to questions were rational according to the extent of his natural capacity. He was determined to go and manage his property, and get a wife who should take care of him. In a few days after his release he was married to a servant belonging to the lunatic asylum where he had been confined. His new wife found after some months that it was impossible to endure the strange conduct of her husband, and after trying various expedients, brought him back to the asylum, with a certificate from a medical man, who had examined him and declared him to be insane. He still remains in confinement, and his derangement is now more complete than formerly, as it plainly involves his intellect. He now raves against his wife, declares that she is married to her own brother, vows bitter revenge for the injuries he has sustained, and vehemently demands his release whenever he is visited by the inspecting magistrates.

Abraham B——'s case was at first merely a perversion of moral habits. If the real nature of this case was otherwise in any degree doubtful, it is rendered obvious by the more decided madness which has since appeared. Very clear indications of a disturbed intellect appeared in his manners and expressions soon after the commencement of his second confinement.

It is probable that many instances of extreme avarice and penury, as those of Elwes and Dancer, and other celebrated misers, were in reality cases of disease. Whether such individuals were proper objects for confinement is quite another question. In the case of Abraham B—— the interference of others was necessary in order to preserve his existence.

The cases above detailed resemble each other in many particulars, and especially in the circumstance that the morbid perversion of habits which characterised each of them took its rise without any cause that could be distinctly traced. In the following instance the appearance of analogous derangement was preceded and probably caused by constitutional disease,

and by the suppression of a long-continued and habitual discharge from the lungs.

The case we are about to relate is a tolerably characteristic example of moral insanity. During one period of its course, when aggravated by temporary circumstances, it indicated some tendency to assume the form of monomania. The patient displayed a proneness to suspicion, and to entertain unfounded impressions connected with the motives and characters of individuals. But these impressions never became deeply fixed or took a permanent hold of the mind, and they soon disappeared. For some years both previously and subsequently to the period alluded to, the complaint wore that appearance which has, we trust, been correctly designated under the term prefixed to the present section.

The account of this case is but slightly abridged from a narrative drawn up by a near relative of the patient.

A. M—— is a maiden lady, aged about 48, of short stature, and somewhat deformed; her natural disposition was steady and industrious. She accomplished her undertakings by dint of application rather than by energetic or sudden efforts. She was constant rather than ardent in her attachments, free from resentment, never the subject of lively emotions; a great respecter of truth, just and very exact in all that she said or did. Her charitable acts were commensurate with her means, deliberate, and the result of principle rather than arising from the mere impulse of compassionate feeling. She was cautious and reserved in her communications, and scarcely if ever formed any familiar and particular intimacies with young persons of her own sex. Being debarred by her infirmities from associating with the young and active, she seemed more like an adult member of the family than a child. She was very clever in arithmetic and in all matters of business, and was fond of regulating and controlling the little affairs of those who formed the domestic circle surrounding her. Young persons and servants, finding that they derived advantage from her advice, generally gave her an opportunity of gratifying her inclination. Her dress, which was always plain and in good taste, was to her an object of greater attention than it often is to persons of fashion.

In March 1822 she was attacked by severe inflammation in the lungs, attended by expectoration of bloody mucus. This was the first time in her life when it was necessary to confine her to bed. She submitted with great reluctance to the restrictions that were needful for her recovery, and would not be persuaded until she had heard the opinion of an old friend of her family, who is a medical practitioner, that the means adopted were proper and required by her case. She was then, however, in a great measure reconciled, and after seven or eight weeks was so far recovered as to bear a removal into her native county. At this period nobody believed that she would survive another winter. Her restoration to her usual state of health was very slow, and her sister, who was her constant companion, perceived with sorrow

that her temper was now much changed. She appeared restless, always wishing to go somewhere, or to do something to which she was unequal; becoming unjustly irritated when she could not urge her sister, whose health and spirits were declining, to fall in with her ideas, and occasionally giving way to reproaches which were keenly felt. She tried every method of persuasion to induce her sister to go to the neighbourhood of London, though for the preservation of her life the latter had been obliged to give up the custom of spending the winter there, and the attempt was considered dangerous to her. Every inducement, every argument was suggested to promote this favourite object: other towns were too warm and too cold, too hilly, too much intersected with water, too foggy. In 1827 she determined to go without her sister to H——, near London. She went, and from her letters her sister perceived that she was living in a state of excitement far surpassing that of her former habits; paying short visits to friends in the surrounding villages, going out in the common short stages, without so much regard to weather as was usual to her even in the summer; receiving small parties at home, attending a very crowded church, writing a great many letters, &c. &c. She used to write to her sister in rather a boastful style, frequently mentioning her good health and high spirits, as if to justify her choice of a residence near the metropolis. When the sisters met during the summer at their house in —shire, her high spirits were gone, she looked more aged than the time elapsed would have led any one to expect, took less interest in her garden, appeared exhausted, and, without contributing her share to the conversation, used frequently to sleep in her chair. She lay much in bed, nursed herself up, and in October went again to H——, as much agog as ever. Another winter passed much as the preceding one had done. She spoke much again of her high spirits, visited much, was observed to be unusually liberal in her presents to most of her acquaintances. A second summer of inertness was succeeded by a winter at H——. She was now weak, indisposed for visiting, and, in fact, so much worse as to be unable to follow her inclinations. In the spring of 1830 she had an attack of the same nature as that in 1822, but not so severe or lasting. In the summer she was nearly as before, and quite as eager to resume her plans, as enthusiastic in her commendations of every body and every thing at H——.

About this time some riots took place in London, and more were apprehended. She now expressed herself as apprehensive that "very awful times were at hand," wrote frequent letters to her sister full of indecision, and expressive of distrust in her servants, her host and his family. A friend who called upon her "was shocked to find her in so low a way." He thought her unfit to be alone, and she was unwilling to adopt any plan for leaving her lodgings, or having any one with her. She said she should be happy with her sister, and knew that she should be taken care of by the latter,

but dreaded becoming a burden to her and making her ill; yet feared that if she did not go to her sister, "some one would put her where no one would know, and cause her to sign papers which she ought not to sign." She was evidently apprehensive of being sent to a lunatic asylum. She thought her host was a writer of "*Swing letters*,"* and dreaded that he might fill the house with combustibles and blow it up with her in it. A medical man who was taken to see her, said that she was in a state of great mental excitement, and ought to be taken to her sister as soon as possible. The frost was severe when she was escorted to her sister, who was then settled at Bristol, yet she took no cold, experienced no injury from fatigue, and lost that feeling of terror to which she had for some time been subject. Since she has been with her sister, she has been increasingly obstinate, suspicious, undecided, restless, parsimonious even to meanness, indisposed to any employment bodily or mental, except as far as relates to a most troublesome interference with the most minute actions of others. Could she have her own way, she would control the food, dress, and employment of every one near her. She has become negligent in dress, and comparatively dirty in her habits, yet has an insatiable desire for new clothes, which she never finds the right time to wear. She is constantly predicting her utter ruin, is sure she will not have money enough to live until such and such a time; knows that enough will not be found to pay Dr. —; knows he will not let any one of so shabby an appearance be long in his house; does not know where she shall go when he is tired of her; thinks that "it is the devil that makes her behave as she does;" "that her heart is hardened to do what she ought not to do;" "she is like the man spoken of in the Gospel, who could not be bound even with fetters." She sees people look at her; hopes they don't think she drinks too much; is quite sure she never did. These impressions are continually varying; but no sooner is her mind tranquillized on one subject than another source of disquietude arises, so that she exhausts every person who is long with her. Her bodily health is better than it was for years previous to her mental derangement. A constitutional asthma, to which she has been subject from the age of six or seven years, has nearly subsided, and the habitual profuse expectoration has considerably diminished. She wears less clothing, and appears less sensible to cold or damp than heretofore.

The writer of this article has had several interviews with the subject of the foregoing relation, during some of which she gave replies to a variety of questions referring to the past and actual state of her health, both bodily and mental. No impression could be traced in her mind that bore the character of maniacal hallucination. The circumstance most observable

* It may hereafter require to be explained that, about the period above mentioned, the threatening letters of incendiaries in various parts of the country frequently bore the signature of *Swing*.

in her condition was a perpetual disposition to find fault with every action, even the most trivial, that was witnessed by her. When asked if she was not aware of this propensity, she seemed to give an unwilling affirmative to the question, and she was plainly aware of the fact, for on the inquiry being made whether the habit had only existed of late years, or had been a part of her natural character, she steadily averred that such was not her natural disposition, "that she was formerly very different."

The preceding cases present no great difficulty as to the conclusion to be adopted respecting the nature of the disorder; such, at least, was the opinion of all the medical practitioners who examined personally the individuals. We now proceed to mention an instance of moral peculiarity which will not allow of so decided an opinion.

Miss A. N—— is a maiden lady of very singular aspect and manners. She has for many years estranged herself from nearly all the friends of her family, formerly a large circle, and associates almost exclusively with her domestics, and one relative who lives with her. Her chief amusement and delight is to invent and relate the most unfounded, and sometimes the most absurd and ridiculous stories. Sometimes she has displayed mortification when in danger of being detected in the invention of these falsehoods, or when questioned respecting them. Her expression of countenance is sometimes very wild and peculiar. She has never shewn any decided mark of mental derangement, nor is she considered as insane, though it has frequently been observed by those who have known her, "that they should not at any time be surprised to hear of her being mad."

No person would venture to pronounce this lady to be insane, or at least to found any proceeding upon the opinion; and yet it is highly probable that her eccentricity depends upon constitutional peculiarity. One of her parents was decidedly insane during a considerable period of life, and the other, as well as several ancestors and relations by blood, laboured under diseases of the brain, of which fatuity in different degrees was the result.

It is generally admitted that there are few questions which physicians are called upon to decide, of more difficult determination than that which relates to the existence or non-existence of insanity in examples which present no obvious and clearly discoverable disturbance in the state of the intellectual faculties. It may be apprehended that the perplexities with which this subject has been environed, will rather be increased than diminished by the recognition of a form of mental derangement admitting the designation here adopted. But the real facts of a difficult question must be known and described in their true relations, before a solution can be sought with any prospect of advantage; and if we are not mistaken in the view of this subject and the facts connected with it, which we have adopted, it will be found that something is gained by admitting a position which places the inquiry relative to the existence of insanity in a different light from

that in which it has most frequently been regarded.

Those who are interested in studying the relations of this disease will do well to consult the able and well-known work of Dr. Conolly. The question how far persons labouring under merely moral insanity are incapacitated for sustaining the relations of society, belongs to medical jurisprudence.

3. *Second form of insanity. Madness attended with hallucination.*—We now proceed to varieties of disease which are of far more easy discrimination than that species of madness which involves merely a perversion of the moral affections and habits. When the patient is found to labour under a disturbed condition of the understanding, when a morbid delusion or hallucination is impressed upon his mind, no doubt can be entertained as to the actual existence of insanity. By the term *hallucination* we mean to express what Cullen and Pinel denote by that of delirium, viz. a belief of unreal events or relations, apprehended under the influence of disease to be actual and real, or some notion repugnant to common sense, impressed upon the mind as true and indisputable, the patient acting under the influence of his erroneous conviction.

There are two very different states of disease attended with this symptom. In one the understanding is, when exercised on many subjects, comparatively clear, and the morbid impressions are partial; in the other, the disturbed condition of the intellectual faculties involves all the operations of the mind. These states are respectively termed monomania, and mania or ordinary mania. Each of them requires a separate consideration.

Of Monomania.—Cases of partial insanity have been by former writers distinguished by the term melancholia, and it has been supposed that a majority of them are of the description by which that term was suggested, involving gloomy impressions and dejection of mind: the designation of mania has been at the same time applied to raving madness, or insanity accompanied by violent excitement. This distinction is laid down in the most explicit terms by Van Swieten. "A mania distinguitur melancholia, quod nondum adsit sævus ille furor, qui in maniacis observatur. Præterea et illud signum diagnosticum melancholice est, quod uni et eidem cogitationi pertinacissime inhæreant tales ægri, et fere circa hanc illamve opinionem delirant tantum; in reliquis omnibus sanam ostendunt mentem et sæpe acutissimum ingenium." It was well observed by M. Esquirol, that the distinction connected with this appropriation of terms is not uniformly supported by facts, as the impressions of partial madness are not always of a gloomy character: the mind, in this form of disease, is not in every instance abandoned to sorrow and melancholy. The term monomania, meaning madness affecting one train of thought, or involving only a single morbid impression, was on these considerations substituted, and has generally been adopted of late times instead of melancholia.

The notion, however, which many persons

entertain as to the nature of the disease thus designated, is very far from being in general correct. It is supposed that the mind is perfectly sound when its faculties are exercised on any subject unconnected with a particular impression which constitutes the entire disease. Cases are on record which, if faithfully recorded, fully come up to this description. In general the real character of monomania is very different. The feelings and affections are in that state which has been described under the head of moral insanity, and on this it would appear that some hallucination or maniacal delusion has supervened. The following case will serve to illustrate the observation which we have just made.

Mr. E. W., a gentleman about thirty years of age, has laboured for several years under symptoms of moral insanity. He has been long dejected in spirits and morose in temper, dissatisfied with himself, and suspicious of all that surrounded him. He was capricious and unsteady in his pursuits, frequently engaging in some new study in the most sanguine manner, and soon abandoning it in despair of making any progress, though possessed of good talents and considerable acquirements of knowledge. He passed the requisite period of time at one of the Universities, but could not be prevailed upon to go in for his degree, either through timidity and want of resolution, or, as it was conjectured by his friends, from a morbid apprehension that the examiners would not deal fairly with him and award him the station to which he aspired and believed himself entitled. He applied himself afterwards to the study of medicine, and then to that of metaphysics, and speedily relinquished both. He frequently changed his residence, but soon began to fancy himself the object of dislike to every person in the house of which he became the inmate. His peculiarities appearing to increase, he was visited by two physicians, who were desired to investigate the nature of his case. On being questioned narrowly as to the ground of the persuasion expressed by him, that he was disliked by the family with which he then resided, he replied that he heard whispers uttered in distant apartments of the house indicative of malevolence and abhorrence. An observation was made to him that it was impossible for sounds so uttered to be heard by him. He then asked if the sense of hearing could not, by some physical change in the organ, be occasionally so increased in intensity as to become capable of affording distinct perception at an unusual distance, as the eyes of mariners are well known to be accommodated by long effort to very distant vision. This was the only instance of what might be termed hallucination discovered in the case after a minute scrutiny. It seemed to be a late suggestion. The individual had been for years labouring under a gradually increasing moral insanity. His judgment had become at length perverted by the intensity of his morbid feelings, and admitted as real an erroneous impression, suggested by his fancy, which happened to be in harmony with his feelings, and served to account for them.

There are, indeed, cases of insanity attended with hallucination on a constant erroneous impression, in which this symptom will appear to many persons to afford but little evidence as to the real nature of the complaint. The delusive impression appears to be so blended with the prevalent disorder of the feelings and affections, or it seems to be so much the result of the peculiar circumstances by which the patient is surrounded, that it is scarcely contemplated as a distinct and peculiar phenomenon. These remarks will receive illustration from the following case.

Mr. H. P. — had been for many years confined in a lunatic asylum, when, an estate having devolved upon him by inheritance, it became necessary to subject him anew to an investigation. He was examined by several physicians, who were unanimous in the opinion that he was a lunatic; but a jury considered him to be of sound understanding, attributing his peculiarities to eccentricity, and he was consequently set at liberty.

The conduct of this individual was the most eccentric that can be imagined: he scarcely performed any action in the same manner as other men; and some of his habits, in which he obstinately persisted, were singularly filthy and disgusting. For every peculiar custom he had a quaint and often ludicrous reason to allege, which indicated a strange mixture of shrewdness and absurdity. It might have been barely possible to attribute all these peculiarities, as well as the morbid state of temper and affections, to singularity in natural character and to the peculiar circumstances under which this person had been placed. But there was one conviction deeply fixed on his mind, which, though it likewise might be explained by the circumstances of his previous history, seemed to constitute an instance of maniacal delusion. Whenever any person whom he understood to be a physician attempted to feel his pulse, he recoiled with an expression of horror, and exclaimed, "If you were to feel my pulse, you would be lord paramount over me for the rest of my life." The result has proved that confinement is not always necessary in cases of this description. Mr. H. P. — has remained at liberty for many years, and his conduct, though extremely singular, has been without injury to himself or others.

We shall conclude our observations on this subject by the record of a remarkable case which illustrates the tendency of moral insanity to degenerate into, or ultimately assume, the character of monomania. The individual who was the subject successively of these forms of disease, was for several years in a state which gave rise to apprehension in many of his friends, while some who narrowly observed him were fully convinced of his insanity. The disease at length broke out in a form which admitted of no doubt.

A gentleman remarkable for the warmth of his affections, and the amiable simplicity of his character, possessed of great intellectual capacity, strong powers of reasoning, and a lively imagination, married a lady of high mental

endowments, and who was long well known in the literary world. He was devotedly attached to her, but entertained the greatest jealousy lest the world should suppose that, in consequence of her talents, she exercised an undue influence over his judgment, or dictated his compositions. He accordingly set out with a determination of never consulting her, or yielding to her influence, and was always careful, when engaged in writing, that she should be ignorant of the subject which occupied his thoughts. His wife has been often heard to lament that want of sympathy and union of mind which is so desirable in married life. This peculiarity, however, in the husband so much increased, that in after years the most trifling proposition on her part was canvassed and discussed by every kind of argument. In the meantime he acquired strange peculiarities of habits. His love of order, or placing things in what he considered order or regularity, was remarkable. He was continually putting chairs, &c. in their places; and if articles of ladies' work or books were left upon a table, he would take an opportunity *unobserved* of putting them in order, generally spreading the work smooth, and putting the other articles in rows. He would steal into rooms belonging to other persons for the purpose of arranging the various articles. So much time did he consume in trifles, placing and replacing, and running from one room to another, that he was rarely dressed by dinner-time, and often apologised for dining in his dressing-gown, when it was well known that he had done nothing the whole morning but dress. And he would often take a walk in a winter's evening with a lanthorn, because he had not been able to get ready earlier in the day. He would run up and down the garden a certain number of times, rinsing his mouth with water, and spitting alternately on one side and then on the other in regular succession. He employed a good deal of time in rolling up little pieces of writing-paper which he used for cleaning his nose. In short his peculiarities were innumerable, but he concealed them as much as possible from the observation of his wife, whom he knew to be vexed at his habits, and to whom he always behaved with the most respectful and affectionate attention, although she could not influence him in the slightest degree. He would, however, occasionally break through these habits; as on Sundays, though he rose early for the purpose, he was always ready to perform service at a chapel a mile and a half distant from his house. It was a mystery to his intimate friends when and how he prepared these services. It did not at all surprise those who were best acquainted with his peculiarities, to hear that in a short time he became notoriously insane. He fancied his wife's affections were alienated from him, continually affirming that it was quite impossible she could have any regard for a person who had rendered himself so contemptible. He committed several acts of violence, argued vehemently in favour of suicide, and was shortly afterwards found drowned in a canal near his house.

It must not be omitted that this individual derived a predisposition to madness by hereditary transmission: his father had been insane.

Of Mania.—The phenomena of mania in its ordinary form are very distinguishable from those of monomania. The aspect, the voice, the gestures of the lunatic in the active state of maniacal derangement, form a contrast with the retired and morose habits of the sullen monomaniac. In cases, however, of mania, distinctively so termed, one impression often occupies the mind of the individual for the time being, and this is frequently some hallucination respecting his own person, some magnificent dream of self-importance and superiority. M. Pinel says, "I was frequently followed at the Bicêtre by a general, who said that he had just been fighting an important battle, and had left fifty thousand men dead on the field. At my side was a monarch who talked of nothing but his subjects and his provinces. In another place was the prophet Mahomet in person, denouncing vengeance in the name of the Almighty. A little further was a sovereign of the universe, who could with a breath annihilate the earth. Many of them seemed to be occupied by a multiplicity of objects, which were present to their imaginations. They gesticulated, declaimed, and vociferated incessantly, without appearing to see or hear any thing that passed. Others, under illusive influence, saw objects in forms and colours which they did not really possess. Under the influence of an illusion of that kind, was a maniac who mistook for a legion of devils every assemblage of people that he saw. Another maniac tore his clothes to tatters, and scattered the straw on which he lay, under the apprehension that they were heaps of twisted serpents."

Ordinary mania, or madness affecting the mind with a general disturbance of the intellectual faculties, is sometimes preceded by occasional fits of excitement and confusion, in which the understanding is hurried and disordered. But it differs from monomania in making its attacks for the most part suddenly and without any premonitory symptoms. An individual, after having undergone an unusual degree of mental and bodily exertion and fatigue, after a fit of intoxication, which in this country is one of the most ordinary of exciting causes of madness, after the excitement of violent passions or anxieties, after exposure to cold and the inclemencies of weather, passes sometimes a day or two in a state of feverish disorder and general uneasiness, and two or three restless nights. His mind is then found to be confused; he appears scarcely to know what he says, talks nonsense, repeats his words frequently, expresses his feelings with an absurd degree of warmth and enthusiasm, cries, laughs, utters rapid and confused sentences in a hurried and impetuous manner. "In the course of a few days, or sometimes at first, he is seized with violent agitations, expresses vague and continual apprehensions, is subject to fits of terror; he is in a state of constant excite-

ment and sleeplessness; he indicates the troubled state of his mind by unusual gestures, by singular appearances of the countenance, and by actions which cannot fail to strike in a forcible manner every observer. The various aspects which the symptoms of the disease assume at this period, have never been more graphically described than by M. Pinel. "The patient sometimes keeps his head elevated and his looks fixed on high; he speaks in a low voice, or utters cries and vociferations without any apparent motive; he walks to and fro, and sometimes arrests his steps as if excited by the sentiment of admiration, or wrapt up in profound reverie. Some insane persons display wild excesses of merriment, with immoderate bursts of laughter. Sometimes, also, as if nature delighted in contrasts, gloom and taciturnity prevail, with involuntary showers of tears, or the anguish of deep sorrow, with all the external signs of acute mental suffering. In certain cases a sudden reddening of the eyes and excessive loquacity give presage of a speedy explosion of violent madness, and the urgent necessity of a strict seclusion. One lunatic, after long intervals of calmness, spoke at first with volubility, he uttered frequent shouts of laughter, and then shed a torrent of tears; experience had taught the necessity of shutting him up immediately, for his paroxysms were at such times of the greatest violence. It is often observed that extatic visions in the night are the preludes to fits of maniacal devotion; and by enchanting dreams, or by the fancied apparition of a beloved object, it sometimes happens that erotic madness breaks out with violence, when it may either assume the character of a calm reverie, or display nothing but extreme confusion in the ideas and the entire subversion of reason."

When the disease has taken a firm hold on its unfortunate victim, it sometimes gives rise to all the internal effects, and displays all the external phenomena which the most intense feelings of human misery, resulting from the real calamities of life, may be imagined to produce. The maniac who becomes the subject of violent excitement "is seen in a state of extreme agitation, with his face flushed, his eyelids inflamed, and his eyes sparkling, his temples beating violently; he talks, cries, sings, grieves, gets into fits of rage by night and by day, and is incapable of taking rest. The melancholic, also, in extreme agitation, but wrapt up in himself, goes to seek in some quiet and dark recess a refuge from his panic terrors, from his gloomy and despairing thoughts; or the means of putting into execution his baneful designs. The insensible and stupid, incapable of any thing, remain unconscious of surrounding objects, and do not even exert themselves to satisfy their most urgent wants. At this period of madness there is a constant want of sleep: the patient often experiences a feeling of tension and of heat in the head, without, however, complaining of it." Sensibility to external impressions, as well as to all bodily changes, is so much lessened, that blisters, cauteries, as well as exposure to in-

tense cold, will sometimes produce but little expression of pain or distress.

4. *Of Incoherent Madness.*—A very peculiar and well characterised form of mental derangement is that of incoherent madness, or incoherency, in which the mind is occupied by a rapid succession of unconnected thoughts and evanescent emotions, and becomes entirely incapable of reflection, or even of distinct apprehension. Such cases are frequent, and are to be met with in every receptacle containing a considerable number of lunatics. Incoherent madness, or incoherency, is the most proper designation for this state of disease, as it describes the essential and characteristic feature. By Pinel the term *démence*, or dementia, has been adopted; and to this there would be no objection if it were not for the circumstance that the same term has been used by Esquirol and Georget with a different meaning, and that confusion would hence arise from an ambiguous designation. Under the term *démence*, the writers last mentioned describe that state approaching to fatuity or idiotism, which is the termination of protracted insanity, and in this sense the word is now commonly received. Since this is a morbid condition very distinguishable from that incoherency which is a primary and idiopathic form of mental derangement, each of these states of disease must have a particular epithet.

This form of madness is in some instances a primary affection; at least the tendency to incoherency displays itself very early in the progress of the case. The disease commences with great excitement; the patient is restless and unusually active; his manners are full of bustle and violence; his countenance flushed; he has sleepless nights; his thoughts follow each other with turbid rapidity; and his whole appearance strongly resembles that of a man of excitable temperament intoxicated with wine or spirituous liquors. In many cases there is no hallucination or erroneous impression on the mind that can be traced, but the violent and irrational activity of the patient is such as to require coercion. The succession of confused and imperfect ideas becomes after a time so rapid as to preclude distinct utterance. The association which connects images in the mind seems to be lost, or at least cannot be traced, and the thoughts appear to be single and insulated. Words and sentences are half pronounced; the voluntary movements are without design, and the effort to perform them is incomplete; it is impossible to fix the attention of the patient sufficiently for obtaining a reply to the shortest question; he becomes almost insensible to the existence of external objects, talks incessantly, or repeats the same word or half sentence over to himself; he takes his food, when it is offered to him, by hasty snatches, and swallows it greedily, or spits it out again in order to continue his unmeaning jargon. After this state of excitement has continued for some time it gradually subsides, and the disease either continues with mitigated violence, but still with the same form of incoherency and want of connection in the course of thoughts

and feelings, or the expressions gradually appear to be more connected, the patient becomes capable of sleep, and a slow progress towards the restoration of the reasoning faculty is perceptible. The writer of the present article has witnessed several instances of complete recovery of the mental powers after the existence, during many weeks and even months, of maniacal phenomena answering to the above description; and every physician who has had opportunities of inspecting lunatic asylums must have observed many cases in which the state of incoherency has terminated in recovery, and others in which it has become chronic and permanent.

The following case described by Pinel is a well-marked instance of the morbid state now under consideration, and it will be sufficient to prove that the affection termed by that writer *démence* is precisely what we have designated as incoherent madness.

"An ardent but ill-informed patriot, and one of the warmest partisans of the celebrated Danton, was present at the sitting of the legislative body, when the writ of accusation was pronounced against that deputy. He withdrew in consternation and despair, shut himself up in his own apartment for several days, and surrendered himself to the influence of the most gloomy ideas. 'What! Danton a traitor!' he repeated without ceasing; 'then is there no man to be trusted; the republic is lost!' His appetite and sleep forsook him. Complete insanity ensued. Having undergone the usual treatment at the *ci-devant* Hôtel Dieu, he was removed to the Bicêtre. He passed several months in the infirmary of this hospital in a state of tranquil reverie, uttering incessantly half-expressed and unconnected sentences. He talked alternately of daggers, sabres, dismantled vessels, green meadows, his wife, his hat. He never thought of eating but when food was actually put into his mouth; and in respect to his functions he was almost levelled with an automaton."

The chronic form of incoherence presents similar phenomena, but in a milder degree. Patients in this last state have intervals of rest; they sleep, and have periods of tranquillity during their waking hours, but seldom or never display coherence and arrangement in their ideas, or make any approach towards a sane and vigorous use of the reasoning powers. Neither have they any appearance of melancholy or abstraction, but they are capable of being momentarily excited by objects which impress their senses and by the scenes around them, though their impressions are transitory and evanescent. They talk to themselves or to others for a long time in phrases scarcely connected by any perceptible link, and in which there is rarely a glimpse of meaning; and if any association can be traced in their thoughts, it is of the most trivial kind, and depending on a word or some sensible object which for a moment attracts their attention. They will sometimes repeat the same word or half sentence many times, but soon forget it.

The disease which we have now described

under the designation of incoherent insanity has been by some writers identified with dementia, or the first stage of fatuity. It is, however, a particular form of mental disease, assuming its peculiar character from the first, and displaying phenomena very different from those of dementia, though, like other forms of madness, it is liable, when long protracted, to pass eventually into fatuity. The writer of this article has seen in private practice and in hospitals several well-marked cases of incoherent madness in the acute form, which ran their course and terminated in recovery without passing into the chronic stage. Of the chronic form, which approaches most nearly to dementia, but may yet be distinguished from that state of disease in its ordinary appearances, some illustrative cases have been pointed out to him in the Lunatic Asylum at Fishponds, near Bristol, by Dr. Bompas, the humane and intelligent conductor of that establishment. Two of these occur in brothers, whose symptoms are very similar, though those of one are more strongly marked than of the other. Although the former of these individuals has been in confinement for many years, his countenance does not display the well-marked aspect of dementia, of which M. Esquirol has given so excellent a delineation. If questioned, he replies with an intelligent look, but in words quite beside the subject, and chatters about a hundred unconnected things in the course of a few minutes. If you repeat the question, it only increases his volubility without apparently drawing his attention a whit more nearly to the subject of inquiry.

5. *Observations on the state of the faculties in madness.*—It has been a question frequently agitated among medical writers, in what precise changes in the organic operations of the brain, as well as in the mental processes which result from these operations, madness consists. The present is not a suitable opportunity for entering into a full discussion of this subject. In a practical point of view, all that is requisite will be obtained by a brief inquiry into the actual condition of the intellectual faculties in insane persons.

It may be observed that consciousness generally remains unimpaired in lunatics, though its exercise, in some cases of madness with hallucination, is connected with singular phenomena. The patient is conscious of his sensations, but he sometimes expresses himself as if his notion of personal identity were strangely confused. He talks and reasons about his feelings as if they were those of another individual. These are by no means frequent cases, and in general lunatics have a distinct perception of their personal identity, and refer their sensations and ideas correctly to themselves.

Sensation likewise remains unimpaired in the insane: the organs of sense at least are not the seats of disease, nor are those processes in the nervous structure on which sensation depends in a deranged state. The sensations produced by light and sound are sometimes morbidly acute, from temporary affection of

the organs of sight and hearing, but this is accidental, and by no means a circumstance characteristic of madness. The effects of cold and other painful impressions are in some instances disregarded by lunatics, but this seems to be merely a result of intense excitement of the mind and its direction to other feelings and operations. Such cases are not so frequent as they are supposed to be, and in general lunatics are sensitive of external impressions.

Perception of external objects is generally unimpaired, but in some cases it is strangely affected and perverted by the morbid impressions on the mind, and by the influence of the prevailing hallucinations.

Maniacal hallucinations are of two kinds. Dr. Cullen has remarked that "*there is sometimes a false perception* or imagination of things present that are not; but this is not a constant nor even a frequent attendant of the disease. The false judgment is of relations long before laid up in the memory."* This means that the hallucination seldom refers to the scene actually present, but to the impressions of memory. When, however, the maniacal reverie becomes very intense, it produces hallucinations or false impressions which represent unreal objects as actually present. Even in this case it does not appear that perception is impaired. Some particular phantasms, the creations of reverie, are presented to the mind in colours so vivid as to produce an effect similar to that of actual perception; the patient in other respects makes no mistakes with regard to place or time; his perceptions of external objects are correct and uniform whenever his attention is directed to perceptible things; but he is so intent upon his reverie, that for the most part he totally neglects them; his fancy becomes so intense in its operation as to carry him away from the influence of his external perceptions, and to environ him with visions of unreal scenes.

We have often seen a lunatic under this form of disease walk up and down a frequented place, sufficiently alive to external objects to avoid falling in the way of horses and carriages, or running against foot passengers, but so intent upon the scene presented by his excited imagination as to be busily employed in issuing commands to troops of which he imagined himself to be the general, and in directing them to enfilade to the right and left, and perform a variety of evolutions. All this he performed with a voice and gesture that were perfectly natural and consistent with reality. To this modification of madness belong those maniacal hallucinations termed by some writers *idolomania* or *dæmonomania*, in which the lunatic fancies that he sees and holds converse with imaginary beings. The conception of the mind is so vivid and intense, that it withdraws consciousness entirely from the sensations excited by surrounding objects, which nevertheless exist, and occasionally under particular circumstances give rise to perception. Maniacal hallucinations have, however, a much

firmer hold on the belief in some cases of madness than the strongest evidence afforded by perception, and hence the futility of those projects which are occasionally suggested for surprising lunatics into a conviction of their false judgments. An insane female confined in an asylum had a firm persuasion that her husband was dead. When he came to visit her, she asserted that it was the devil who had assumed his form. Her recollection and perception had remained unimpaired, but the insane hallucinations overcame their evidence and held possession of her mind.

The power of reasoning or judgment does not appear to be so much impaired in madness as the disposition to exercise it on certain subjects. Often there is a manifest unwillingness to admit any evidence unfavourable to the false notions impressed upon the mind, while great ingenuity is displayed in finding arguments which may tend to make it apparently more reasonable. A case illustrative of this remark has been already mentioned.

In many instances of madness it would appear that the characteristic feature of the disease is a morbid inclination to indulge in reverie, and to yield the judgment and all the faculties to its controul. The impressions of reverie are so modified by disease as no longer to be distinguishable from those of memory or active reflection. We may venture to say that this observation will go far towards explaining the mental phenomena of the disease.

6. *Disorders in the state of the physical functions attendant upon madness.*—The phenomena of madness which attract most observation, and which indeed characterize the disease, are those which depend upon the disordered state of the cerebral functions; but other processes in the living body are likewise in a state of derangement. There is in most cases of insanity, besides the morbid condition of the brain and nervous system, more or less of disturbance in the physical functions; the secretions, excretions, appetite, and digestive processes are frequently disordered. Medical writers have differed in opinion as to the relation which these affections bear to the cause of insanity. Pinel has stated it to be the result of his inquiries that the primary seat of mental alienation is generally in the region of the stomach and intestines, and that from that centre it propagates itself, as it were, by irradiation, and deranges the understanding. Others have looked upon the disorders in the functions of the viscera as merely contingent results of a primary disease, seated in or immediately affecting the brain.

Whichever of these opinions may be correct, the general, or at least the frequent co-existence of disorder in the physical functions with that affection of the brain from which the deranged state of the mind immediately results is an indisputable fact.

The physical functions are differently affected in different forms of madness. In disorders of slow and gradual accession, and especially in those cases in which the mind is melan-

* First Lines, ¶ 1558.

choly and depressed, a torpid state of the vital and natural functions for the most part prevails; the circulation is languid; the pulse weak and generally slow; the extremities cold; the skin cold and clammy; most of the secretions are defective; the bowels are torpid, and sometimes obstinately constipated and flatulent, requiring strong doses of aperient medicine. The appetite is defective; digestion is impaired; sometimes there is a constant loathing of food, which, if the patient were not obliged to eat, would induce him to starve himself, and it is often extremely difficult to persuade persons in this state to swallow nutriment sufficient for the preservation of life. Emaciation and loss of strength inevitably result from these circumstances, but they are sometimes not so striking as any person would anticipate.

Attacks of maniacal disease, which break out suddenly with great excitement of the passions, with general disturbance of the intellectual faculties, or with incoherence, are almost always accompanied by symptoms of fever or pyrexia more or less acute. The pulse is rapid, often full, and beating with disproportioned strength in the carotid and temporal arteries; the skin is hot and the tongue white; there is thirst; with loss of appetite, headach, sleeplessness, and great irritability; the secretions are deficient; the urine is high-coloured and scanty, and the bowels are constipated. The face is often flushed; the eyes are glossy and suffused; the conjunctiva is injected with blood, and the pupils are contracted. The patient sometimes complains of pain in the forehead and temples, with a sense of weight upon the head, or of constriction, as if the scalp were tightly drawn. It has been observed that in some instances persons who had previously suffered severely from headach have ceased to complain of it when madness has supervened, and that it has returned when such patients have become convalescent. Want of rest is often a troublesome and distressing symptom. Many patients pass whole nights without closing their eyes, or when they obtain sleep, it is short and agitated. In other instances a few hours of sound sleep are the prelude to a paroxysm of renewed excitement, the maniacal symptoms breaking out on waking with increased violence.

All the symptoms which refer themselves in a perceptible manner to the head are liable to undergo occasional exacerbations during the continuance of madness. Increased heat of the scalp, redness of the eyes, fulness and strong pulsation of the carotid and temporal arteries, want of sleep and consequent irritability of the temper and feelings, indicate and precede or accompany renewed periods of violence in the symptoms of mental derangement.

In many instances of maniacal disease there is much disturbance in the functions of the intestinal canal. This observation has been made more particularly in persons whose general health has been previously much neglected; in the inmates of some lunatic asylums; in individuals of the lower class, who have been subjected to hardships and unwholesome diet,

as well as to cold and a damp unwholesome atmosphere; in cases in which the disease has followed excesses of various kinds, or confinement on ship-board, with the use of salt provisions. In many instances of this description it has been found that the bowels had been long in a confined and torpid state. In those instances in which it is stated that the bowels are open and even more loose than natural, it often appears on further examination that a long-continued torpor and constipation have given way to diarrhoea; the abdomen, which had previously been swelled with indurated matter, has become more distended than before, flatulence being added to the load of solid contents but partially discharged. The evacuations are thin and watery, or contain mucus mixed with vitiated bile and recent aliment in an undigested state. Sharp and transient pains are experienced in various parts of the abdomen, which is often tender on pressure; at length, in very neglected cases, dysentery supervenes and brings on extreme emaciation. The tongue is often red or covered with a brown fur, and the mouth and fauces with a viscid mucus, which, together with saliva, the patient spits out in all directions. There is great thirst and a peculiar fetor of the breath, which extends to the whole person. The appetite is depraved; in many cases the patient has an aversion to all food; in other instances he has a keen and voracious desire for it, and greedily devours without selection every thing eatable that falls in his way. The skin is cold; there is a remarkable coldness of the extremities, resulting from the damp state of the skin and a want of energy in the circulation through the extreme vessels. In some cases of long duration there are papular or scaly eruptions; and in exhausted and debilitated subjects, furunculi appear in various parts of the body, which are much disposed to slough.

Cases of madness, coming on with some degree of rapidity, are often preceded and sometimes accompanied or followed by suppressions of natural or customary discharges, by the disappearance of external diseases, or the cure or suspension of internal complaints. The relation which these changes bear to madness as causes or results may be different in different cases; they are connected circumstances of that disease. The catamenia, if not suppressed previously to the manifestation of cerebral disorder, soon become scanty, or cease entirely after its actual appearance. Lochiæ and other analogous effluxes are suppressed; ulcers, which had become habitual and had long discharged, are dried up; chronic eruptions generally disappear, or are materially lessened; symptoms of pulmonary phthisis in various stages cease or become mitigated in a remarkable degree. On the decline of maniacal disease, it is often found that the return of such discharges, or the revival of suspended trains of morbid symptoms such as we have described, is the harbinger of restoration to a sound state of mind, though not to complete bodily health.

SECT. III.—*Of the duration of insanity, and of the modes of its termination.*

The duration of insanity is various, and admits of no general estimate. In some instances this disease has subsided in the course of a few days after its commencement; in others it continues for many years. M. Esquirol has remarked that it is not uncommon to meet with inmates of lunatic asylums who have been twenty, thirty, or even forty years in confinement. The same observations must have occurred to every person who has been in the habit of visiting such establishments.

Insanity has three different terminations:—first, in recovery; secondly, in a state of fatuity, or of chronic and permanent failure or obliteration of the mental faculties; thirdly, in death. The last is generally the contingent result of some of those disorders in the physical functions of the body to which the insane are especially liable. We shall allot a separate consideration to the circumstances connected with each of these events of insanity.

1. *Of recoveries from insanity.*—Recovery from madness sometimes takes place suddenly, but more frequently it is gradual, and preceded by several periods of mitigation in the intensity of disease, and often by lucid intervals.

The prospect of recovery is much greater in young persons than in those of advanced years, and it diminishes, other circumstances being equal, with the patient's age. M. Esquirol has observed that few lunatics are cured after the sixtieth year. It must, however, be taken into the account that few comparatively are for the first time attacked by madness after that period of life.

The curability of madness, or, to speak more correctly, the proportion of maniacal cases which terminate in recovery, is likewise subject to great variation from circumstances which refer to the nature of the disease, its occasional complication with other maladies, the sex and constitution of the patient, the mode of treatment to which he is subjected, and the causes which have given rise to his disorder; and hence any general calculations on this subject are matters rather of curiosity than of practical value. One remark, however, may be of use, as it may encourage medical practitioners in their efforts to remove or mitigate the disease. Of cases which present no peculiarly unfavourable combinations, a much larger proportion terminate in recovery than is generally supposed, or than any person could be led to believe from the inspection of reports from hospitals. In these reports it generally happens that a great number of inveterate cases, and of such as are incurable from their conjunction with other diseases dangerous to life, and indicating changes in the organic condition of the brain, are blended with those of simple insanity in the general averages.

M. Esquirol has endeavoured, by comparing the reports of several extensive hospitals in France and England, to throw some light on the curability of madness, or on the proportion of recoveries. The following table presents some facts which are of great interest.

<i>Table of recoveries from madness.</i>			Admissions.	Recoveries.
<i>In England.</i>				
In Bethlehem Hospital	..... from 1748 to 1794	.....	8874	2557
" " "	..... in 1813	.....	422	204
In St Luke's	..... from 1751 to 1801	.....	6458	2811
In York Asylum	.....	.....	599	286
In the Retreat, near York	..... from 1801 to 1814	.....	163	60
	Totals ..		16516	5918
<i>In France.</i>				
Charenton	..... from Nov. 22, 1798 to 1800, 22 July 1803	.....	97	33
Salpêtrière	..... from 1801 to 1805	.....	499	161
"	..... from 1804 to 1813	.....	1002	407
"	..... from 1806 to 1807	.....	2005	1218
"	..... from 1812 to 1814	.....	531	286
"	..... from 1801 to 1813	.....	891	413
In M. Esquirol's private establishment,	from 1801 to 1813	.....	335	173
	Totals ..		5360	2691

From the data contained in this table, M. Esquirol concludes, "first, that the absolute number of recoveries from madness is about one in three; secondly, that the number of recoveries varies from one in four to one in two, or to one-half of the number of persons affected: this difference depends upon particular circumstances of locality, on the nature of the cases, and of the treatment pursued: thirdly, that cures are more numerous in France than in England." He adds that they are much more rare in Germany and in Prussia.

A much more extensive collection of reports from various lunatic asylums, both public and private, in England, France, and other countries, has been made by Dr. Burrows, who has constructed from these materials a table exhibiting the proportion of recoveries. The evidence afforded by such collections is very much confused, and in many instances rendered wholly inconclusive from the variety which exists in the regulation of different establishments as to the nature of the cases admissible into them, and the time during which the patients admitted are kept. For instance, the hospitals of Bethlehem and St. Luke impose certain exclusions elsewhere unknown. They reject all patients who have been more than twelve months insane; those affected by paralysis, however

slight, and by epilepsy or convulsive fits; idiots, the aged and infirm; those discharged uncured from other hospitals: there are likewise other exclusions besides those above mentioned, and all persons who have not recovered at the expiration of one year are dismissed. Yet, on comparing the reports of these hospitals with those of other institutions, the regulations of which are less favourable to a high proportion of cures, and where no selection or exclusion exists, we do not find, as Dr. Burrows remarks, the relative number of recoveries to be so great as might be expected. It is indeed surprising to find that the reports of Bethlem Hospital, of a century and a half ago, give a greater proportion of cures than those of many years preceding 1817, when an improvement took place in the arrangements of that establishment. Dr. Burrows remarks on the authority of Stow, who derived his information from Dr. Tyson, physician to Bethlem Hospital, that "from 1684 to 1703, 1294 patients were admitted, of whom 890 were cured, which is a proportion of two in three. But from 1784 to 1794, 1664 patients were admitted, of whom 574, or rather more than one in three, recovered." It is probable that there were circumstances in the former arrangements which, if they were known, would explain this difference. On the whole, the results of Dr. Burrows' inquiries are much more favourable to British hospitals than those of M. Esquirol. It appears, indeed, from his statements that the proportions of recoveries in England are greater than those obtained in France, Germany, and, *à fortiori*, in any other country in Europe. This may be in some degree judged of by comparing the following statements, taken during late years, with those previously given from M. Esquirol's collections.

In Stafford Asylum, from 1818 to 1828, admissions 1000; cured 429; or about 43 in 100.

In Lancaster County Asylum, from 1817 to 1825, admissions 812; cured 322; or about 39 in 100.

In Wakefield County Asylum for the West Riding of Yorkshire, from 1819 to 1826, admissions 917; cured 384; or about 42 in 100.

From these statements it clearly appears that M. Esquirol's computation of recoveries is much below what really takes place under favourable circumstances. The results are so different under different circumstances, that no general average can be of much value in a practical point of view.

Another inquiry, which admits of a more satisfactory elucidation, and which leads to results very interesting in their relation to prognosis, refers to the period of the disease during which recovery is chiefly to be expected. Some facts, tending to illustrate this question, were contained in a memoir presented by M. Pinel to the French Institute in 1800. It appeared from this memoir that the greatest number of recoveries from madness take place in the first month of its duration, the recoveries during the first being compared with those of succeeding months. The mean time for the

duration of the disease, in cases terminating favourably, was fixed in the same document at from five to six months. This result was deduced from a selection of cases from which the author excluded all those which had been under previous treatment, as well as cases of long duration. A longer term is assigned to this disease, in cases terminating in recovery, by Mr. Tuke in his account of the Retreat at York; and M. Esquirol, whose accuracy of research in subjects of this nature gives to his authority the highest value, confirms the opinion of Mr. Tuke. He has drawn this conclusion from a statement of the cases admitted into the Salpêtrière during ten years, as shewn by the following table.

Table of recoveries at the Salpêtrière during ten years.

Admissions.	1804.	1805.	1806.	1807.	1808.	1809.	1810.	1811.	1812.	1813.	1814.	Totals of Cures.
209	64	47	7	4	3	2	1	1	1	..	..	129
212		73	54	4	2	2	1	..	..	..	1	137
206			78	49	10	3	1	1	..	..	..	143
204				60	55	11	1	..	2	..	..	129
188					64	57	4	2	1	..	2	130
209						48	64	1	4	1	3	129
190							48	51	7	1	3	110
163								44	30	8	3	85
208									75	41	11	127
216										50	49	99
2005												1218

It seems that the report on which this table was founded, extended from the year 1804 to 1813; 2804 female lunatics were admitted during this interval, of whom 795 were considered as incurable, on account of their advanced age, or because they were idiotic, epileptic, or paralytic subjects. The remaining

2005 were put under treatment without regard to the duration or peculiar character of their disease. Out of this number, 604 were cured during the first year, 497 in the second, 86 in the third, and 41 in the seven succeeding years. From these data M. Esquirol draws the following conclusions: first, that the greatest number of recoveries are obtained in the two first years; secondly, that the mean duration of cases that are cured is somewhat short of one year; thirdly, that after the third year the probability of cure is scarcely more than one in thirty. There are, nevertheless, examples which prove that we ought never to despair of the recovery of lunatics. M. Pinel, from Baumes, cites the case of a lady who passed twenty-five years in a state of lunacy, within the knowledge of the whole country where she lived, and who suddenly recovered her reason. "I have seen," says the same writer, "a girl who from the age of ten years was in a state of dementia, with suppression of the catamenia. One day, on rising from bed, she ran and embraced her mother, exclaiming, 'Mamma! I am well!' The catamenia had just flowed spontaneously, and her reason was immediately restored. Such facts are rare, but they serve to prove that from the duration of the disease alone there is no reason to despair altogether of recovery." A few instances of the same kind have occurred in several lunatic houses or public hospitals, from the superintendents of which the writer of this article has obtained information respecting them.

From another table published by M. Esquirol, it appears that, out of 269 maniacal patients, 27 were cured in the first month of their illness, 34 in the second, 18 in the third, 30 in the fourth, 24 in the fifth, 20 in the sixth, 20 in the seventh, 19 in the eighth, 12 in the ninth, 13 in the tenth, 23 after the first year, and 18 after two years. This is perhaps an attempt at a greater degree of accuracy in calculation than is, from the nature of circumstances, attainable. The same writer has made a remark in illustration of the greater proportion of recoveries observed in the early period of madness, which is worthy of attention. He says, "I have constantly observed that in the course of the first month from the commencement of the disease a very marked remission takes place. About that period the maniacal excitement, which had previously run its course as an acute disorder, seems to have reached its termination as such, and it is then that it passes into a chronic state, the crisis having been incomplete. This remission, which I have watched with the greatest accuracy, must be attributed to the complaints which are complicated with madness at its commencement." The author implies, though he does not clearly express himself, that the natural termination of the disease, when unimpeded by complication with other maladies, or by more or less of organic lesion in the brain, is in the very early stage.

Recoveries from madness are in many instances complete. There are numerous persons who have been insane for six or twelve months,

or during a longer period, and have afterwards entirely recovered the vigour of their intellectual faculties, so as to be capable of as great and effective mental exertions as previously to the attack. Others, and perhaps these are the majority, are curable only to a certain point. These persons remain, as M. Esquirol has observed, in such a state of susceptibility that the slightest causes give rise to relapses, and they only preserve their sanity by continuing to live in a house where no mental agitation or inquietude, no unfortunate contingency is likely to fall to their lot, and throw them back into their former state. There are other individuals whose faculties have sustained such a shock that they are never capable of returning to the sphere which they had held in society. They are perfectly rational, but have not sufficient mental capacity to become again military officers, to conduct commercial affairs, or to fulfil the duties belonging to their appointments. Such cases may be about one-tenth in the number of recoveries.

Convalescents are as subject to relapse as those who are advancing towards recovery from other diseases. But lunatics are in many instances likewise prone to a recurrence of the disease after it has been entirely removed, or at least after its manifestations have long ceased to be observed. The same observation may be applied to other disorders of the nervous system. It would seem that one attack of disease has in these cases left the patient with a stronger predisposition than he formerly had to the complaint, whatever it may have been, and that the morbid tendency is strengthened after every renewed incursion. The most trifling circumstances have in these instances sufficient influence to produce the morbid condition of the brain and of the mind. At length the patient is scarcely ever in a lucid state; the intervals lessen in duration, and become more and more imperfect in degree, until disease finally becomes in a great measure permanent.

The proportion of cases in which madness is recurrent has been overrated. According to M. Pinel, in 71 cases out of 444 recoveries relapse took place, or, rather, the disease was in those instances recurrent. This gives somewhat less than one-sixth of the whole number as recurrent; but the same writer allowed that out of the 71 cases 20 patients had previously relapsed, or had undergone several attacks, 16 had left the hospital at too early a period, 10 came afterwards under treatment and recovered without relapse, 14 had given themselves up to grief and intemperance, and several others were under circumstances unfavourable to continuance in health. M. Esquirol published a report of 2804 recoveries, in which number only 292 recoveries of disease took place, that is, a little more than one-tenth. M. Desportes, however, has stated that, in 1821, 52 recurrent cases were recognized at the Bicêtre, out of 311 admissions, that is, about 17 in a hundred; at the Salpêtrière in 454 admissions there were 66 relapses, about 15 in a hundred, or one-seventh. But in the proportion of recurrent

cases indicated by this last report, it is probable that there were, as M. Georget has well observed, many cases which had been discharged in a state of incomplete recovery, as well as a considerable number of drunkards, who come habitually every year to spend a few weeks in the Bicêtre or the Salpêtrière, having been picked up in the streets in a state of intoxication.

In all instances we may consider it as certain that the improbability of recurrence increases with the length of the interval of time during which the patient has existed without manifesting signs of renewed disease, and that it is also greater in proportion to the completeness of the recovery. When the energy of mind is fully restored, relapse is much less to be feared than when it remains weak and excitable.

Second termination.—Fatuity—Dementia—Amentia.—The ultimate tendency of madness when protracted, and the state to which insane persons, if they do not recover, are in general sooner or later reduced, is that of fatuity. The fatuity which constitutes the last stage of mental derangement differs in its phenomena from congenital idiotism. It has more resemblance to the imbecility of extreme old age, but from this last affection, which we shall describe at the conclusion of the present treatise, it is distinguishable and in many instances very different. For the sake of greater precision we shall divide maniacal fatuity into two grades or stages. The first is that state which Esquirol and Georget have named *démence* or dementia, a term which is established by the authority of these writers, and has been received into general use: the second stage of fatuity, which is the last period of mental decay, and presents an almost entire obliteration of the faculties, may be properly distinguished by the term *amentia*.

1. *Dementia.*—The approach of dementia, or the first period of fatuity, is indicated by a comparative state of calmness succeeding to the previous excitement of the maniacal period. It is not the calmness of returning reason, but the result of mental activity worn out, the subsidence or obliteration of the affections or moral feelings, and the decay even of physical sensibility. It has been well remarked by M. Georget that the characteristic of dementia is a forgetfulness of the past, with a total indifference as to the present and future. Demented persons are generally quiet and inactive; they take little notice of persons or external things, without appearing to be occupied by any internal emotion or train of thought. They often, however, smile or laugh without any apparent reason, or sing, or pronounce, as if accidentally, single words or sentences. Some remain for days or weeks without uttering a word, or betraying by look or gesture the least consciousness of external impressions. Such impressions, however, are sometimes afterwards discovered to have been not entirely unobserved. Many appear, by their looks or replies to questions, to know and remember their friends or relatives, but scarcely display signs of emotion or sensibility on being

visited by them. Not a few even in this state are capable of being employed in mechanical occupations. Females knit or sew, or perform any work with their hands to which they had been previously habituated; and men draw, or write letters or sentences, in which, however, their imbecility is generally conspicuous. Some patients have occasional periods of greater excitement, in which the symptoms of a more active state of madness resume their prevalence. In other instances mere physical activity displays itself at intervals in peculiar ways, as by running, jumping, or walking round continually in a circle or determinate figure.

The physical health of patients thus affected is in general tolerably good; they are often fat, have good appetites, digest their food, sleep well, and if in the previous stages of the disease they had been emaciated, they often recover their natural degree of plumpness on the approach of dementia. Hence the return of physical health without a corresponding improvement in the state of the mental faculties, is, as it has been remarked by the writer last cited, an unfavourable prognostic in cases of maniacal disease.

There are, however, some rare cases of recovery from this first stage of fatuity. Pinel informs us that many, especially young persons, who had remained in the Bicêtre several years or months in a state of absolute idiotism, have been attacked by a paroxysm of acute mania of twenty, or five-and-twenty, or thirty days' continuance. "Such paroxysms," he adds, "apparently from a re-action of the system, are in many instances succeeded by perfect rationality." The same result has been observed on the restoration of demented persons or of maniacs in the advanced stage of insanity after severe attacks of fever of that kind which is usually attended with delirium. Such attacks are often fatal to lunatics; but of those who recover them not a few are subsequently restored to the possession of their faculties.

These instances of restoration from fatuity take place only after the first stage. When the disease has passed into complete amentia, it is altogether hopeless.

2. *Amentia.*—Scarcely any exhibition of human suffering can be more deeply affecting than the aspect of a group of lunatics reduced to the last stage of fatuity, and those who have never witnessed such a spectacle can hardly imagine so abject a state of mental degradation. In a group of this description an individual may be seen always standing erect and immovable, with his head and neck bent almost at right angles to his trunk, his eyes fixed upon the ground, never turning them round, or appearing by any movement or gesture to be conscious of external impressions or even of his own existence. Another sits on a rocking chair, which she agitates too and fro, and throws her limbs into the most uncouth positions, at the same time chaunting or yelling a dissonant song, only capable of expressing a total inanity of ideas and feelings.

Many sit constantly still, with their chins resting on their breasts, their eyes and mouth half open, unconscious of hunger or thirst, and almost destitute of the feelings which belong to merely physical life; they would never lie down or rise were they not placed in bed and again raised by their attendants. A great proportion of the patients who are reduced to this degree of fatuity are found to have lost the use of their limbs in a greater or less degree by partial or general paralysis.

From such a state it is scarcely imaginable that recovery ever took place, but patients in the last stage of fatuity often linger for many years. Their state, however, is not always uniform: some of them have comparatively lucid intervals, at which nature seems to make an effort to light up the mind and recall lost impressions and ideas. A patient has often been observed by the writer of this article, who sits all day in a wooden elbowed chair, with his chin hanging over his breast, appearing hardly conscious of existence and unable to assist himself in the calls of nature, who would not eat if food were not actually put into his mouth. He has been for several years in the same state, except that he occasionally appears to rouse himself, and for a short time to recover an unusual degree of animation. At such periods he will sometimes read a chapter in the Bible with a clear voice and a distinct and intelligible articulation.

3. *Of the termination of madness in death.*
—Madness is not to be reckoned among the diseases which are very dangerous to life. The state of the brain on which it depends, though incompatible with the continuance in a sound state of those functions on which the mental operations are associated, is yet such as to carry on other processes, dependent on the brain, which are subservient to physical existence.

This conclusion is established in a most convincing manner by the duration of insanity, and the cases even of longevity which occur among lunatics. We are informed by M. Desportes that among the lunatics at the Bicêtre in the beginning of the year 1822, one had been lodged there fifty-six years, 3 upwards of forty years, 21 more than thirty years, 50 upwards of twenty years, 157 more than ten years. At the Salpêtrière the entry of patients dated, 7 cases from fifty to fifty-seven years, 11 from fifty to sixty, 17 from forty to fifty.

The morbid state of the brain is, however, liable to increase beyond the limit above adverted to, and then the usual phenomena dependent on severe cerebral disease are manifested. It is well known that lunatics are subject in a much greater proportion than other persons to apoplexy, palsy, epilepsy, and all the trains of symptoms depending on different degrees or modifications of cerebral congestion.

Another mode by which madness brings on a fatal termination is by the exhaustion arising from continued excitement. There are many cases of maniacal disease in which the ceaseless excitement of the feelings, the constant hurry of mind and agitation of body, the total

want of rest and sleep, and the febrile disturbance of the system which frequently ushers in the attack of madness, and is always a prominent feature in cases of this description, bring on a very marked reduction of strength as well as of flesh: the degree of emaciation is sometimes extreme. Generally this state of excitement gradually abates, or the means adopted to lessen it and tranquillize the system are attended with success; but this is not uniformly the case, and some maniacs die completely worn out and exhausted. It is in part owing to this cause that the mortality among lunatics is more considerable during the two first years from the period of their attack than in the succeeding years, a fact which appears to be established by the calculations of M. Esquirol. In the Salpêtrière the number of deaths is even much greater in the first year than in the second. Of 790 lunatics who died in that hospital between the years 1804 and 1814, it appears that 382 died in the first year from their admission, 227 in the second year, and 181 during the seven succeeding years.

Many lunatics are carried off by diseases of the abdominal and thoracic viscera, which are complicated with madness. Pathology does not enable us to explain the connexion between organic diseases of the lungs or bowels and disordered action of the encéphalon, and hence many have been inclined to regard the combinations of morbid states to which we now advert as accidental. They are perhaps too numerous to be attributed to chance. The combination of madness, as well as of some other diseases of the brain and nervous system, with diseased states of the liver and of the intestinal canal, was pointed out some years since by the writer of this article. The conjunction of insanity with pulmonary phthisis is a fact established beyond doubt by the observations of M. Esquirol, who remarks that phthisis often precedes the appearance of melancholia, or accompanies it. The disease of the lungs is in these instances latent; the patients lose their strength, become emaciated and suffer under slow fever, sometimes attended with cough and diarrhœa; the phenomena of madness rather increase than abate under these circumstances, and continue until death. On the examination of the body, the lungs are found tuberculated or affected by melanosis.

Diseases of the heart are not unfrequently complicated with madness. We are assured by M. Foville, that, of the bodies of lunatics which he examined after death during three years, five out of six displayed some organic disease either of the heart or the great vessels. This was very frequently hypertrophy of the heart. These morbid changes, however, are probably, as M. Foville has observed, more frequently results of the continued agitation, the violent efforts and cries, which in such patients bring on diseases in the thoracic organs, than predisposing causes of cerebral disorder.

Diseases of the intestinal canal, whether they exist or not at the onset of the maniacal

attack, are subsequently among the frequent causes of death. A state of obstinate constipation often continues for a long time, attended by its usual accompaniments. It gives way, and is followed by or alternates with diarrhœa, which wastes the strength of the patient and terminates in a fatal dysentery. When the body is examined, the intestines are found sometimes distended and loaded with indurated matter, at others empty and pale, with disease of the mucous coat, discoloured and abraded patches or ulceration, and gangrenous spots.

In protracted cases death either results from increase in the disease of the brain, which up to a certain degree had only subverted the operations of that organ subservient to the mental function, and at length becomes incompatible with the merely physical functions of the same viscus; or it is the result of accidental disorders, which, owing to the peculiar state of the brain and other organs in lunatics, are more than usually fatal.

Fatuity or inveterate lunacy becomes complicated with paralysis. M. Esquirol says that of the number of persons who die in a state of lunacy, one half are paralytics. This paralysis of the demented is a peculiar affection, for we are not now referring to hemiplegia, attacks of which are liable to occur at all periods of madness, either ushered in by apoplexy or without it, and which frequently carry off maniacal patients. The general paralysis to which lunatics in the advanced stage are most subject shews itself first in the muscles of articulation; patients have some difficulty and imperfection in speech, which is in the beginning so trifling as to escape those whose attention is not particularly directed to the circumstance. The muscles of the limbs and trunk become subsequently affected; the patient walks with a tottering or shuffling gait, and his trunk is bent forward; his hands shake; his limbs become emaciated and feeble; sometimes he bends towards one side, and at length passes his time in a sitting posture, and bent forward, or takes to his bed, when the sphincters gradually lose their power, sloughs take place about the back, the sacrum, and elbows, followed by gangrene and death.

Many lunatics in the advanced stage labour under a degree of cachexia bordering on scurvy. The skin is beset with scaly or papular eruptions, or discoloured in patches; furunculi appear in different parts of the body, which are much disposed to become sloughy; the gums become red and sore, and bleed; the surface of the body is cold with a clammy perspiration; diarrhœa, and abdominal pains accompany these symptoms; the patient apparently suffers under defective nutrition and a gradual decay of physical life, and dies in a state of extreme emaciation or marasmus.

The preceding are perhaps the natural sequelæ of the diseases under which lunatics suffer in connexion with their original complaint. A great number, however, are carried off by disorders which may be considered as accidental, but to which the condition of body in patients of this description ren-

ders them more than other individuals liable. Fevers which assume more or less of the typhoid character, severe catarrhs, and pulmonary affections, are the most frequent of them. It will be supposed that fevers which affect the brain are fatal to lunatics, and such is the fact in a very marked degree.

The diagnosis of accidental diseases in lunatics presents, as M. Georget has well observed, remarkable difficulties. Some patients of this description are continually making unfounded complaints, deceived by their erroneous or fancied sensations. On the other hand, many lunatics labour under very severe affections without revealing them by any expression, either because these affections are latent and do not occasion suffering, or because the disturbed state of their minds does not allow their sensations to reach the centre of perception. In this last relation the medical treatment of lunatics is much more obscure and difficult than that of young children, because the latter are conscious of their ailments, and express them by their cries. "When we observe a lunatic, who had previously been agitated and furious, become morose and taciturn, and at the same time lose his appetite, seek repose, and display a suffering and dejected expression, we ought to examine him carefully: he is threatened with some acute disease. The development of symptoms will soon point out the seat and nature of the complaint, and consequently by what sorts of means it is to be opposed. But chronic affections are so slow in their approach and concealed in respect to their symptoms, that they often reach to a very advanced stage before their existence is suspected, unless the organs affected are examined before their diseased condition has manifested itself. We find the lungs full of tubercles, with cavernous excavations and abscesses, or in a state of atrophy, in the bodies of individuals who had neither coughed nor expectorated, nor experienced pain or dyspnoea during life; they had become gradually debilitated, had taken to their beds, and after a continually increasing emaciation, had at length sunk. The disorganization of the lungs had only been discovered by the aid of auscultation and percussion. We must not then wait for the expression of complaints on the part of lunatics in order to have our watchfulness excited to the means which are necessary for preserving their existence."

SECT. IV.—Of the causes of insanity.— *Predisposing causes.*

1. *Natural constitution.*—Among the circumstances in the previous condition of an individual which prepare him for sustaining the attack of this disease, the most important is a certain peculiarity of natural constitution. This consists chiefly, as it is probable, in a particular organization of the brain and nervous system, rendering those individuals so constituted liable to become insane when exposed to the influence of certain agencies, which in other persons either give rise to a different train of morbid phenomena, or are,

perhaps, devoid of any injurious effects. The constitutional peculiarity which predisposes to madness is not distinguished by any remarkable external characters. That such a natural tendency, however, actually exists, and in all instances is a necessary condition to the development of maniacal disease, is to be inferred from the consideration that similar exciting causes exert their influence on other persons without producing a like effect. Among the agents that give rise to madness, there is none more influential than intemperance, or the frequent use of ardent spirits. A considerable proportion of lunatics in the lower classes of society owe their disease to this cause. But it is only in a certain proportion of persons addicted to intemperance that the phenomena of madness make their appearance. Others, under the influence of the same noxious cause, are affected with apoplexy or paralysis; in many the brain escapes and the liver becomes disordered, or dropsy takes place, with or without disease of the liver; in some the lungs become the seat of morbid changes. It is evident that there must be an original difference in the habit of body whence arises the diversity of results brought about by the same or very similar external agencies. This original difference is apparently a peculiarity in the congenital constitution of each individual. It may be transmitted from parents, or it may arise *de novo*, as other varieties in the congenital structure are known to do. Hence it is comparatively of little moment, as far as an individual is concerned, to inquire whether his morbid predisposition has been derived by hereditary descent, or has sprung up with himself. It may, indeed, be observed that peculiarities which arise in a race are often common to several individuals even in the first generation. Albinos, for instance, though the offspring of parents of ordinary complexions, very frequently have brothers or sisters resembling themselves. In like manner, diseases which appear for the first time in a family often affect several members of it, who partake of the same peculiarity of temperament or congenital structure.

If these remarks are well founded, it must be apparent that hereditary madness is not less curable than a disease having symptoms of the same description, which has not been previously observed in the family of the person affected by it.

That the predisposition to madness, when it has once arisen, is frequently transmitted, is a fact too well established to admit of doubt; it constitutes a feature in the history of the disease.

The hereditary transmission of this tendency is remarked by M. Esquirol to be more general among the opulent than the lower classes. He states the proportion of hereditary cases among the former to be one-half, among the latter to be one-sixth. This, however, seems to be a mistake, as it appears by his table that of 351 cases at the Salpêtrière, 105, or nearly one-third, had the disease by inheritance. Among 264 patients of a superior class 150 cases were,

according to the same writer, hereditary. He accounts for this difference by referring to the exclusive marriages of aristocratical families, a cause which had formerly in France much influence. It remains to be determined whether the same difference is to be observed elsewhere under circumstances not admitting this explanation.

The same writer affirms that persons born before their parents had become maniacal are less subject to mental disease than those who are born after the malady had displayed itself. He makes a similar remark as to those who inherit the disease only on one side, in comparison with persons whose paternal and maternal ancestors had been affected by it. According to Burton the offspring of parents advanced in years are more subject than others to melancholy madness.

Another observation relating to the hereditary transmission of this morbid tendency is, that the disease is apt to shew itself in different individuals of a family at a particular period of life, and in all of them under a similar character. M. Esquirol has made this remark, and he has mentioned several facts in illustration of it. "Two sons of a merchant of Switzerland died insane at the age of nineteen years. A lady, aged twenty-five years, was attacked by puerperal madness; her daughter suffered in like manner at the same age. In one family the father, the son, and the grandson, all committed suicide about their fiftieth year. There was at the Salpêtrière a prostitute who had thrown herself into the river seven times; her sister drowned herself in a fit of intoxication. There exists near Nantes a family in which seven brothers and sisters are in a state of dementia. A gentleman, affected by the first events of the revolution, remained during ten years shut up in his chamber. His daughter, about the same age, fell into a similar state, and refused to quit her apartment. This predisposition, which manifests itself by external signs, by peculiarities in the moral and intellectual character of individuals, is not more surprising in connexion with madness than are the instances of gout, of phthisis pulmonalis, and other diseases, in a different point of view. It may be traced from the age of infancy: it furnishes the explanation of a multitude of caprices, irregularities, and anomalies, which at a very early period ought to put parents on their guard against the approach of insanity. It may furnish useful admonitions to those who preside over the education of children. It is advisable in such cases to give them an education tending to render the habit robust, and to harden it against the ordinary causes of madness, and particularly to place them under different circumstances from those with which their parents were environed. It is thus that we ought to put in practice the aphorism of Hippocrates, who advises to alter the constitution of individuals in order to prevent the diseases with which they are threatened by the hereditary predisposition of their family."

M. Esquirol affirms that many facts have,

occurred within the sphere of his information proving a strong predisposition to madness to have arisen from some accidental fright sustained by the mother during pregnancy. Marked cases of this description are said to have occurred during the period of the Revolution.

2. *Age*.—Persons in the middle period of life are most subject to attacks of insanity properly so termed. M. Esquirol has remarked that imbecility is the predominant mental disorder of childhood, mania of youth, melancholia of more advanced manhood, and dementia of old age.

The years during which madness most frequently makes its first appearance are those between thirty and forty in the age of the individual: next to these are the years between twenty and thirty; thirdly, are those between forty and fifty. Insanity is comparatively rare in the earlier as well as in the later periods. The case, however, of a child who had been maniacal from the age of two years was noted by Joseph Frank at St. Luke's in 1802. M. Esquirol mentions besides three instances of maniacal children. Dr. Haslam and others have reported some cases of the same description, but they are not of frequent occurrence.

M. Georget has observed that out of the number of 4409 lunatics in different hospitals in France and England, 356 were between the ages of ten and twenty, 106 from twenty to thirty, 1416 from thirty to forty, 861 from forty to fifty, 461 from fifty to sixty, 174 from sixty to seventy, and only 35 upwards of 70.

The following table, given by Dr. Burrows from Reports of the French hospitals, tends further to illustrate the proportional frequency of madness at different periods of life, and it has the advantage of distinguishing the sexes.

	Ages.	Men.	Women.	Total.
From 10 to 19	—	78	62	140
20 to 29	—	198	267	465
30 to 39	—	248	324	572
40 to 49	—	231	290	521
50 to 59	—	132	218	350
60 to 69	—	119	146	265
70 to 79	—	76	101	177
80 to 89	—	7	4	11
Ages unknown.	}	6	0	6
		1,095	1,412	2,507
Under 50 years of age.	}	755	943	1,698
Above 50 years of age.	}	340	469	809
				2,507

3. *Sex*.—If we may believe Cælius Aurelianus, madness was among the ancients more frequent in males than in females. In France, according to M. Esquirol, the reverse of this statement is true. This writer attributes the greater comparative liability of modern females to the vicious system of modern education, to the preference given to mere accomplishments,

to the reading of romances, which gives to young persons a precocious sensibility, premature desires, and ideas of perfection which they nowhere find realized, to the frequenting of plays and assemblies, the abuse of music, and want of occupation. In England, he observes, where women have an education more strengthening to the mind, and where they lead a more domestic life, the proportion of female lunatics to the male is less considerable. These considerations may account for the facts in respect to the higher orders, but as the observation includes those who are the inmates of hospitals, we must have recourse, in order to explain it, to the physical circumstances in which the condition of females differs from that of the male sex. The difference is in fact so great in France, that M. Pinel, in 1802, calculated that there were two female to one male lunatic. According to the report "Sur le service des aliénés," by M. Desportes, made at Paris in 1823, it appeared that from 1801 to 1821 the number of males admitted at the Bicêtre was 4552, and that of females at the Salpêtrière during the same period, 7223. At Bethlem, according to Dr. Haslam, 8874 lunatics were admitted in the course of forty-six years, of whom 4832 were females, and 4042 males. At St. Luke's, according to a statement made to a committee of the House of Commons in 1807, the number of females is usually greater than that of males by about one-third. In comparing a number of statements from different countries, M. Esquirol, however, concludes that the excess in the proportion of female lunatics is not so considerable as it is generally supposed to be, and that it does not, in fact, greatly exceed the difference which exists between the sexes in the ordinary state of the population. It is greater in some countries than in others, and in France than in England.

4. *Celibacy*.—M. Georget was inclined to reckon celibacy among the predisposing causes of madness, from considering the following facts detailed in the report of M. Desportes.

Out of 1726 female lunatics 980 were single women, 291 were widows, 397 were married persons.

Out of 764 males 492 were single, 59 were widowers, and 201 were married.

These relative numbers appear remarkable, but in estimating the result we must take into our account the fact that married persons lead in general more regular lives than the unmarried, that they are generally more fixed in their pursuits and their condition as to maintenance and employment, and less subject to causes which agitate the mind and excite strong emotions. These remarks apply, however, principally to men, and the difference is equally great among females.

5. *Temperament*.—A constitution of body predisposing to violent passions also predisposes to madness.

With respect to complexion, which is generally supposed to denote varieties of temperament, it does not appear that there is any particular shade or hue of eyes or hair which marks a predisposition to this disease. On a

comparison of facts collected from several countries, M. Esquirol has not been able to discover any decided difference. In the Parisian hospitals a chesnut colour of both eyes and hair prevails, which is the general colour among the people of the north of France.

6. *Season*.—M. Georget has given briefly the result of reports indicating the influence of seasons. It seems that during the six summer months a greater number of persons are received into the lunatic asylums than in the six months of winter.

7. Among the most powerful of the causes which render persons obnoxious to madness, must be reckoned previous attacks of the same disease. When such attacks have been repeated, the predisposition becomes increased. There are instances, however, of persons who during a certain period of their lives have been subject to repeated attacks of maniacal disease, but have recovered entirely, and have lived many years in a state of perfect sanity.

8. Other diseases of the brain, such as apoplexy and paralysis, sometimes predispose to madness, or are followed by it. Epilepsy of a severe and inveterate kind is sometimes complicated with insanity. These cases are distinct from the fatuity which is often the result of long-continued epilepsy. The form of maniacal disease connected with epilepsy is peculiar, and this may be considered as constituting a distinct disease. It has been ably described by the late Dr. Edward Percival.

9. *Education*.—An erroneous and unsuitable method of education is among the most influential causes of insanity. There are two different points of view under which the injurious effects of wrong education may be considered. By too great indulgence and a want of moral discipline, the passions acquire greater power, and a character is formed subject to caprice and to violent emotions; a predisposition to insanity is thus laid in the temper and moral affections of the individual. The exciting causes of madness have greater influence on persons of such habit than on those whose feelings are regulated. An overstrained and premature exercise of the intellectual powers is likewise a fault of education which predisposes to insanity, as it does also to other diseases of the brain. These are two considerations which are of the greatest importance with respect to the welfare of families to which an hereditary constitution may belong, rendering them more liable than others to cerebral diseases. They are distinct in themselves, and each might furnish a theme for an extensive treatise, most valuable in a practical point of view. Under the first head it would be necessary to consider the efficacy of those plans of education of which the professed object is to form a character remarkable for sedateness, for the strict discipline of the feelings, and, as far as this is attainable, for the abolition of strong passions and emotions. Such, undoubtedly, would be the kind of moral education best adapted for those who are constitutionally liable to insanity. The second remark, on the regulation of mental exercise in young persons whose

nervous systems are feebly constituted, has a more extensive bearing than on the subject of insanity. It brings forward a suggestion which is of general interest in these times in which mental exertion is stimulated to the utmost, and when in reality all the physical and moral powers are sacrificed to the cultivation of intellect, or in many instances to the mere acquisition of knowledge.

Exciting causes of madness.—The immediate causes of madness are in part physical agents, and in part moral. Perhaps it may be remarked that the former are the most prevalent causes of madness in the lower ranks of society, and the latter in the higher class, whose intellects are more developed, and whose minds are subjected to more extensive influences.

1. Among physical causes of madness, one of the most frequent is the immoderate use of intoxicating liquors. There is hardly a tribe of the human race who have not succeeded in inventing some method of producing intoxication. Ardent spirits are perhaps, of all, the most injurious in their effects, particularly on the lower classes in the northern countries of Europe and America. It has been repeatedly observed that a large proportion of the cases admitted into pauper lunatic asylums arise from this cause. They are in general to be reckoned among the cases most easily cured, for, although this is not uniformly the fact, it often happens that when the exciting cause is removed, the effect begins to lessen, and eventually ceases. When these patients are prevented from obtaining stimulating liquors, and are treated with sedative remedies, they quickly shew signs of amelioration and the subsidence of disease.

The use of opium and other stimulants is among the exciting causes of madness, though of much less general agency than the ordinary means of intoxication.

2. Blows on the head, and exposure to ardent solar heat, are well known to be occasionally the exciting causes of madness. It is plain that they act by bringing on inflammation, or a state bordering on inflammation, in the encephalon. The same remark may be made with respect to mercury, as used in syphilitic diseases. It is probably an error to suppose that syphilis is itself a cause of madness.

3. *Intestinal irritation*.—A disordered state of the intestinal canal often becomes a cause of disturbance in the brain, by whatever antecedents the former disease may have been induced. The state of the intestinal canal to which we allude is itself much more frequently of an inflammatory nature than it has generally been imagined, or at least than it was formerly supposed to be. In that condition of the canal which gives rise to costiveness alternating with diarrhoea, and accompanied with indigestion, flatulence and eructations, anorexia and nausea, transient but often acute pains in the hypochondria, livid and yellow suffusions of the skin, viscid secretions in the mouth, or redness of the fauces and palate with a glazed and dry surface, the whole train of symptoms often depends upon a low degree of chronic inflamma-

tion in the mucous membrane of the intestinal canal; and this is perhaps a frequent, if not an ordinary state in those cases in which disorders of the nervous system supervene on complaints of the stomach and bowels. This form of disease has been described by Dr. Ferriar and several other practical writers; but it is to M. Broussais that we are indebted for a more ample development of its pathology.

The enteric disorder, which lays the foundation for maniacal symptoms, as well as for other affections of the nervous system, is the result in different instances of various and very diverse noxious causes. The most frequent is excess in the use of stimulant and indigestible food. Too great indulgence of the appetite among the more opulent, and among the lower classes long-continued constipation, unwholesome diet, the use of salt provisions, exposure to cold and want, or neglect of warm clothing, give rise to diseases of the same description.

Intestinal worms are one of the results of constipation. Madness produced by the last mentioned cause is probably of very rare occurrence. M. Esquirol has, however, mentioned a remarkable instance of maniacal disease, affecting a young man, who was cured at two different periods by the expulsion of a large quantity of worms from the intestinal canal.

3. *Causes depending on states of the uterine system.*—States of the general system connected with irregularities of the uterine functions are well known to coexist with or to display themselves in various affections of the brain. Among them madness is one. Maniacal affections of this class may be mentioned under three heads.

a. *Dysmenorrhæal affections.*—Some females at the period of the catamenia undergo a considerable degree of nervous excitement: morbid dispositions of mind are displayed by them at these times, a wayward and capricious temper, excitability in the feelings, moroseness in disposition, a proneness to quarrel with their dearest relatives, and sometimes a dejection of mind approaching to melancholia. These are distinct from the cases of hysterical affection connected with the same periodical causes of excitement. The former are sometimes the preludes of a far more permanent disease.

b. *Suppressions of the catamenia.*—Sudden suppressions of the catamenia are frequently followed by diseases of the nervous system of various kinds. Females exposed to cold, undergoing powerful excitements, sustain a suppression of the catamenia, followed in some instances immediately by fits of epilepsy or hysteria, the attacks of which are so sudden as to illustrate the connexion of cause and effect. In attacks of madness the catamenia are for the most part wholly or partially suppressed during the early periods, and in many cases it is not easy to say whether the suppression is the effect or the cause of the disease. There are instances, however, in which the circumstances sufficiently indicate the order of connection. Dr. Burrows has detailed a case in which suppression brought on by mani-

fest causes was followed by mania. We have already alluded to the case of a young female mentioned by M. Esquirol, who suddenly exclaimed that she was cured of her disorder; her catamenia had flowed spontaneously, and her restoration to sanity was the immediate consequence. Facts so decisive in their bearings on pathology are not of very frequent occurrence, but their evidence reaches farther than the individual cases recorded.

It often happens that after some weeks or months in the duration of madness, the catamenia, though previously deficient, become restored nearly to their usual state. This, like the other indications of improvement in merely physical health, is only a favourable sign when it is accompanied by some amendment in the state of the mental faculties. Without any such change, it rather gives reason to apprehend that the disorder is becoming inveterate, and perhaps already making its transition from mania into an incipient stage of fatuity.

c. *Puerperal madness* is another modification of the disease connected with the state of the uterine functions. As this form of insanity is a most important subject, and in circumstances very peculiar, we shall allot a distinct section towards the conclusion of this treatise to the consideration of its history and pathology.

5. *Metastasis.*—The pathological fact, that diseases of the brain, and among others that from which madness results, supervene on the cessation of various discharges, on the healing of old ulcers, on the disappearance of cutaneous eruptions, on the cessation of inflammatory disease in membranous and other structures, on the removal of tumours, has been observed with greater or less attention by practical writers on medicine from the time of Hippocrates. Many cases illustrative of this fact are to be found in the works of Hildanus, Tulpius, and Hoffmann; and Sauvages, among the forms of madness, has reckoned one which he terms metastatic. M. Esquirol says that even a cessation of the usual discharge from the nostrils, of leucorrhœa, of blennorrhagia, as well as the disappearance of scabies, of herpes, of gout and rheumatism, has produced madness. In general it may be observed that the suppression of acute eruptions, whether pustular, exanthematic, or erysipelatous, is followed by acute inflammatory affections of the internal organs; in such cases the brain or its membranes are attacked by phrenitis or meningitis; while the disappearance of chronic disorder of the same class is the precursor of mental aberration. The suppression of more copious discharges, the removal of large tumours, the disappearance in dropsical cases by rapid absorption of deposited fluids without increased excretion, has been followed by determinations of blood to the head, giving rise to fatal apoplexy or severe convulsions.

6. *Moral causes of insanity.*—Among the moral causes of insanity we must reckon all the circumstances which are calculated to give rise to strong emotions, or to excite the passions. Strong emotions, by their operation on the nervous system, produce injurious effects on the

brain, and give rise to disturbed actions in that organ, whence arises mental derangement. The passions and emotions are indeed the principal and most frequently productive causes of madness.

In barbarous nations, among whom the mind is uncultivated, the passions are proportionally impetuous, but their sphere is limited, and the intellectual and moral faculties are very imperfectly developed. Madness is comparatively rare among such nations. According to Von Humboldt there are very few lunatics among the native Americans, and a similar observation has been made with respect to other uncivilized tribes. In Russia, Turkey, and China, madness is unfrequent. In the hospital of Grand Cairo, a city containing 300,000 people, M. Desgenettes found only fourteen lunatics. It must, however, not be forgotten that in such places many deranged persons are suffered to wander about through neglect and the absence of regulations for police, and that their numbers thus escape observation; yet this circumstance is not sufficient to account for the entire difference between barbarous and civilized countries, in respect to the apparent frequency and rarity of madness. It might be affirmed that mental derangement is the result of a deviation from the state of nature, if we were to agree with those who look upon barbarism as the natural condition of our species, and represent all that is ennobling and exalted, all that is good and really desirable in human life, as foreign or accidental, and the produce of forced and unnatural culture. In this as in other instances, it has pleased Providence to mix up with the greatest blessings some portions of evil, some ingredients of intense suffering: "*Medio de fonte leporum, Surgit amari aliquid, quod in ipsis floribus angat.*"

Various kinds of mental excitement have different degrees of influence in producing madness, under different social and political circumstances. Among the patients of the Salpêtrière, in 323 cases admitted during the years 1811, 1812, M. Esquirol reckoned 105 originating in domestic chagrins, 77 occasioned by poverty and reverses of fortune, 45 by disappointments in love, 38 by fright, 8 by fanaticism. Cases of what is termed religious madness are supposed to be much more frequent than this small proportion seems to imply, but it is much to be desired that we could determine the meaning of the expression religious madness, and to what examples of disease it may be correctly applied.

There can be no doubt that madness has often been produced by a vehement and impassioned style of preaching. "In the kingdom of Naples," says M. Berthollet, "a custom exists of preaching in favour of missions by a particular set of priests. In order to animate the faith of believers, they accompany their orations with particular acts, which are often of such a nature as to produce too powerful an effect on weak minds. They hold their hands over flaming torches, and whip themselves with scourges garnished with iron points. Their sermons are prolonged till the close of day, and

the feeble glare of a few flambeaus heightens the effect of the scene." "One of these sermons gave occasion to the case I am about to describe. The subject was *hell*: to heighten the colouring of the frightful picture which the preacher had traced, he took a skull in his hand, and having raised a question as to the abode of the soul to which it belonged, he exclaimed, invoking it, 'If thou art in heaven, intercede for us; if thou art in hell, utter curses.' He then cast it from him with violence. The lady, whose case is subsequently described in M. Berthollet's memoir, was instantly affected by a morbid change in the nervous system."

Strong emotions excited by vehement preaching produce continually in females and very sensitive persons, fits of hysteria, and in those who are predisposed to mania there can be no doubt that similar causes give rise to attacks of madness. Cases, indeed, are of continual occurrence which establish the fact.

But the terrors excited by a troubled conscience, which have given birth in the imagination to gorgons and chimeras, and monsters of darkness, are sufficient of themselves to produce madness in persons predisposed. None can entertain a doubt on this subject who recollect the stories of men persecuted by the Furies, the appalling self-tortures and mutilations, the blood-stained altars and the hideous divinities, the sacrifices of wives and daughters, the gloomy and hopeless fatalism of the pagan world. There is no remedy for these evils, resulting as they do from the moral and physical disorders of human nature, but the mild and consoling influence of Christianity; and if this religion has been made in some instances the instrument of evil rather than of good, we must recollect that the greatest blessings are capable of becoming by perversion the fertile sources of severe calamities. Perhaps some persons may suppose that if it were possible to divest the minds of men of all religious anxieties at once, together with all belief, they would be gainers by the change. But this experiment has been already tried in France, in a great part, during one period of the Revolution, and the following remarks of M. Esquirol display the results, as far as they relate to the increase or lessening of insanity.

"The changes," he observes, "which have taken place during the last thirty years in our moral sentiments and habits, have produced more instances of madness in France than all our political calamities. We have exchanged our ancient customs and fixed habits, our old and established sentiments and opinions, for speculative theories and dangerous innovations. Religion now only comes forward as a formal usage in the solemn transactions of life; it no longer affords its consolations to the afflicted, or hope to the desponding. Morality founded on religion is no longer the guide of reason in the narrow and difficult path of life. A cold egotism has dried up all the sources of sentiment; there no longer exist domestic affections, respect, attachment, authority, or reciprocal dependences; every one lives for himself; none are anxious to form those wise and salu-

tary provisions which ought to connect the present age with those which are destined to follow it."

SECT. v. — *Necroscopical investigations of madness.*

Recourse has been had to anatomical investigations with a view to illustrate the pathology of madness, and although such researches have not answered fully the expectations with which they were entered upon, they have led to results by no means devoid of interest in their physiological bearing, and capable, though to a limited extent only, of practical application.

This department, as well as most others, of pathological anatomy, may be said to begin with Morgagni. That celebrated writer has, however, related the details of but seven or eight dissections referring to cases of insanity. In these he remarked several facts which later observations have confirmed. He found the substance of the cerebral hemispheres more firm, and that of the cerebellum softer than natural. In one instance the white substance of the cerebrum was hard and of a brownish hue, and its bloodvessels, as well as those of the plexus choroides, much distended with blood: in another there was hardening of the hemispheres and softening of the fornix, fullness of the cerebral vessels, adhesion of the pia mater: in a third, injection of the meninges and the plexus, hardening of the brain, and softening of the cerebellum. This writer mentions also collections of serous fluid in the ventricles and in the tissue of the pia mater.

The researches of Greding were much more extensive, and his observations more various. Among the facts remarked by him are thickenings of the cranium, either partially or generally observed in 167 ordinary maniacal cases out of 216, in 78 out of 100 cases of raving madness, and in 22 out of 30 cases of idiotism or imbecility; softness of the brain in 51 cases out of 100, especially in mania complicated with epilepsy; wasting of the optic thalami in two cases of dementia; enlargement and contraction of the ventricles; serosity in these cavities, or dryness of their surfaces; adherence of the dura mater to the skull; thickened and blue colour of the pia mater; softness of the tubercula quadrigemina; osseous or stony concretions in the cerebellum.

Dr. Haslam has given the details of 37 cases of madness with the appearances discovered on dissection. In not one of these cases were the brain and its membranes free from morbid appearances. In almost all, the membranes either bore marks of former inflammation or were distended with blood: in 16 cases there was an effusion of serum between the membranes, and in the lateral ventricles this was observed eighteen times. In nine cases the consistence of the brain was firmer than usual; in seven it was softer, but in 20 not perceptibly altered. In three cases the cranium was thicker, and in three thinner than the natural state. In several cases a peculiar looseness of the scalp was observed.

The following are the most remarkable of

the observations made by M. Esquirol on the morbid appearances of the brain in madness. The cranium thick and compact; in other cases thin and porous; often injected with blood: crania irregular in respect to the different diameters, and to the cavity of the two sides. Membranes thickened in 11, injected in 19 cases. Basilar arteries ossified in five cases. Cerebrum dense in 15, soft in 19 cases. Cerebellum dense in 12, soft in 17 cases. Grey substance abundant in five, discoloured in 15 cases. White substance injected in 19 cases. Adhesions of the lining membrane of the ventricles in 54 cases. Serous depositions frequent between the pia mater and the arachnoid, as well as in the ventricles. Plexus choroides displaying almost always serous vesicles, (kystes séreuses.) Many other morbid changes have been pointed out by the same writer, such as tumours, vesicles (kystes), partial softenings and ossifications of the arachnoid. Two cases of acute maniacal disease, observed by M. Esquirol, are recorded by M. Georget,* in which the brain presented all the characteristics of intense inflammation.

M. Georget has recorded with great precision the facts which he has himself observed. The following are the most remarkable. Irregular conformations of the cranium, the prominences of which are developed irregularly, those of the right side being generally larger than those of the left; some skulls having the lateral diameter of equal extent with the antero-posterior, and the cavities of the base irregular in extent; some skulls, one in 20, thickened partially or generally; more frequently the bones hard, white, without diploe, resembling ivory; some very light. Dura mater rarely changed; sometimes adherent to the skull, thickened, containing deposits of bone. Arachnoid displaying in places additional laminae of a red or grey colour; sometimes thickened but smooth. Pia mater injected; or thickened and infiltrated with serum, giving at first the appearance of a gelatinous deposit. Volume of the brain sometimes less than the cavity of the cranium seems to require. Some brains very hard, cut with difficulty; the white substance glutinous, elastic, and suffering distention; more frequently the brain is soft, the grey matter being pale and yellowish, and the white substance discoloured, of a dirty white, the colour and consistence of these portions almost confounded. The convolutions separated by serosity and the pia mater thickened. Interior cavities of the brain appearing in some instances very large, in others small, often filled with a serous fluid remarkably clear and limpid; plexus choroides exanguineous, containing hydatiform vesicles. Partial softenings of the brain; erosions, ulcerations of the surface of the ventricles. Cerebellum generally softer than the cerebrum; sometimes partially softened. Mesocephalon, medulla oblongata, and medulla spinalis rarely display morbid changes of structure.

M. Georget has thus summed up in a short compass the morbid changes which have been

* Art. *Encéphalite*, in the *Dict. de Médecine*.

observed in the heads of maniacal subjects.

1. Bones of the cranium sometimes thickened, sometimes without diploë, thick and resembling ivory; sometimes light and spongy; inequalities in the form of the cranial cavity.

2. Injections, thickenings, serous infiltrations, of the pia mater; separations and attenuations of the cerebral convolutions. 3. Surface of the cerebrum softened and adhering to the pia mater, so that the latter, when pulled off, raises portions of the cerebral substance with it; injected state of the cerebral substance, reddened colour of the grey portion, marbled violet hues in the white portion, increased consistence of both; discoloration and general softening of the cerebrum, grey substance yellowish, white substance of a dirty white; serous collections in the ventricles, particularly in the lateral ventricles; partial softenings. Other alterations are much less frequent; the annular protuberance, and the four great nervous trunks which take their rise from it, the medulla oblongata and the medulla spinalis, are rarely found to have undergone any material change of structure.

Some curious and interesting additions have been made to the morbid anatomy of madness by M. Foville, whose researches were conducted with great accuracy. It was a part of his plan to compare, in every instance on the spot, healthy brains with those which were the subjects of examination as having appertained to maniacal patients. By this method some minute peculiarities of structure seem to have been detected which might otherwise have escaped notice. M. Foville's inquiries were carried on at the Salpêtrière in conjunction with his colleagues, MM. Delaye and Pinel Grandchamp, when that hospital was under the superintendence of M. Esquirol, and subsequently by himself at the establishment of the Lower Seine, an extensive receptacle for lunatics, which has been for some years under his immediate care. His observations are arranged under the following heads: 1. morbid changes in the cortical substance; 2. changes in the white or fibrous substance; 3. changes in the nerves of sensation; 4. changes in the membranes; 5. observations on the skull and the hairy scalp; 6. changes observed in idiots. We shall abstract the most remarkable phenomena noticed under several of these divisions.

1. *Changes in the grey substance.*—In the most acute cases the surface of the cortical portion presents, on the removal of the membranes, a most intense redness, approaching to that of erysipelas. This is still more marked in the substance of the grey matter itself; it is more striking in the frontal region than on the temporal lobes, and in the higher regions than in the posterior parts of the brain. In brief terms the morbid changes observed by M. Foville in acute cases of madness are nearly confined to the following: "Red colour, uniform and very intense; numerous mottled spots, varying from a bright to a violet red, bloody points, minute extravasations of blood; diminished consistence in the thickness of the cortical substance, coincident mostly with a slight increase of consistence in its surface; dilatation of the

vessels, resistance of their parietes." In acute cases M. Foville has never observed adhesions of the membranes to the cortical substance. Such adhesions are very frequent in chronic cases, and hence, as he conjectures, may be explained the curable nature of recent maniacal affections, and the hopeless and incurable state of those patients who have long laboured under madness or dementia.

Among the chronic changes of the cortical substance, the most frequent is a very perceptible increase of firmness and density in the superficial part, extending to no great depth, but uniform, constituting a distinct lamina, smooth externally, but internally irregular, of lighter colour than usual, which, when torn off, leaves the remainder of the cortical substance red, soft, and mammillated, somewhat resembling granulations. Something like this external pseudo-membrane of the cortical substance has been noticed in wild animals which have died in a state of confinement, by M. Foville, and is conjectured by him to denote a cerebral disease in them. The pale and almost bleached hue of the surface of the cortical portion is always connected with this increased density in its substance. Sometimes the surface is rough and granulated, containing small grains of a yellowish white.

In conjunction with these changes the volume of the convolutions remains natural, or is less than usual. When lessened, there are sometimes linear depressions or irregular pittings on the surface of the convolutions, and in the cortical substance itself there are small yellowish lacunæ filled with a serosity of the same tinge. These lacunæ are supposed to correspond with the minute extravasations observed in acute cases. In other instances the diminution of volume is a real atrophy of the convolutions, which appear thin and angular, as if pinched up towards their extremities. This morbid change corresponds with what MM. Gall and Desmoulins have termed atrophy of the convolutions. It is very frequent in the frontal regions of the hemispheres. It often comprises particularly three or four convolutions on each side of the sagittal suture, a chasm filled with serosity occupying the place left by absorption of the cerebral substance. Co-extensive with this appearance is that species of atrophy in the cranium in which the diploë disappears, and the external lamina approaches the internal, leaving a superficial depression on the head. In these cases of atrophy of the convolutions, the diminution of substance is confined frequently to the cortical or grey matter. What remains of the cortical substance is harder than natural, and sometimes presents, when carefully examined, a really fibrous structure; it is of darker colour, or seems to separate into layers, of which the exterior is pale and the interior of a rose colour.

Another state of the cortical substance observed in chronic cases of madness is that of softening (*ramollissement*); this is entirely distinct from the softened state of the external portion already described. The whole thickness of the grey substance is equally altered in

these cases; its colour is more brown than usual; its consistence almost liquefied.

This extreme and general softness of the cortical substance does not necessarily accompany a similar state in the white substance; it is sometimes conjoined with a hardened state of the medullary portion. In such instances the grey may be separated from the white matter by pouring water upon it. Appearances of this kind seem to belong to cases of the last degree of dementia, with general paralysis and marasmus. M. Foville mentions cases apparently of the same nature, in which limited portions of the grey substance had disappeared previously to death. M. Calmeil, in his work on the paralysis connected with insanity, has related two instances of a similar description.

It seems that the grey substance in other parts of the brain is not subject to a similar change; its morbid alterations coincide with those of the medullary portion. From this remark must be excepted the cortical substance of the cornu ammonis, which is sometimes softened, and at others of a scirrhous hardness.

2. *Morbid changes of the white substance.*—Morbid alterations of the white or fibrous substance in mad persons are in relation to its colour, its density, and its texture.

The white substance is often the seat of vascular injections; sometimes vessels of a certain size being affected, the appearance of bloody points is produced on the section of the white substance. In other instances a finer injection gives rise to a mottled appearance of a deep red or violet colour. A magnifying glass is required in order to discover the vascular injection which produces this appearance. These injections of the white fibrous substance do not always coincide with similar injections of the surrounding cortical substance.

It is not rare to find in lunatics the fibrous substance of a splendid white; this particular aspect generally corresponds with an increased density of the parts. The hardness of such parts of the brain is sometimes almost fibro-cartilaginous. The induration of the medullary substance is, however, not always connected with this remarkable whiteness; sometimes the hardened medullary substance has a yellow tinge or a grey leaden colour. M. Foville attempts to account for this hardening of the fibrous portion of the brain by the supposition that each cerebral fibre has contracted morbid adhesions with the surrounding fibres, so as to render their separation impossible. This opinion is offered as more than conjecture with respect to the different planes of medullary substance, of which it is considered as proved that the white substance of the brain consists. The fibrous mass of the hemispheres results, according to this writer, from the super-position of several distinct layers or planes, applied one upon the other, and connected by means of a very fine cellular tissue. These planes are easily separable in the healthy state, but in the state of maniacal induration they are inseparable.

Among lunatics affected with general para-

lysis, M. Foville has found these adhesions wanting in only two cases; and in these two instances the cerebral nerves, the annular protuberance, and the medulla oblongata presented an extreme hardness. The same alteration has been found in the brains of old men whose voluntary movements have become uncertain or vacillating; it has never been seen in lunatics whose muscular powers had remained unimpaired.

The brains of some lunatics are so full of serous fluids, that an abundant serosity flows from the surface of incisions; sometimes this serous infiltration is so abundant as to deserve the name of cerebral œdema. A change more rare, which M. Esquirol has remarked, was the presence in the brain of a multitude of small cavities, from the size of a millet-seed to that of a nut, containing a limpid fluid. The section of a brain thus changed is compared to that of a porous cheese. The cavities are supposed to be the sequelæ of extravasations.

The changes in the structure of the cerebellum are analogous in kind to those of the cerebrum, but much more rare.

Tubercles and other tumours in the brain are not considered by M. Foville among the causes of madness properly so termed.

3. *Morbid changes in the nerves.*—M. Foville is persuaded that he has traced morbid alterations in the nerves corresponding with peculiar phenomena of sensation. In a female lunatic, tormented by hallucinations of sight, the optic nerves were found hard and semi-transparent through a great part of their thickness.

4. *Morbid changes in the membranes.*—In acute cases, the only morbid appearance discovered in the meninges is for the most part injection of the pia mater. This injection is generally proportioned to the degree of inflammation in the cortical substance of the convolutions. The small arteries and veins, passing from the membrane and penetrating the grey matter, are seen distended with florid or black blood: the arachnoid in the mean time preserves its natural aspect.

The chronic changes in the membranes consist for the most part in opacity, increased consistence, thickness of the arachnoid, the formation of granulations, and pseudo-membranes on its surface, and the effusion of serosity into the cellular tissue of the pia mater and the ventricles.

The arachnoid membrane displays either extensively or in patches a pearly whiteness. The opacity never exists without thickening; and in those places where the arachnoid and pia mater are naturally contiguous, they are found to be adherent. These opaque patches, as M. Foville supposes, result from the deposition of albuminous layers upon the arachnoid.

The observations of the same writer on the peculiarities observed in the skulls of lunatics add little to our previous knowledge on this subject; and his remarks on the conformation and texture of the brain in cases of idiotism do not necessarily belong to the subject with

which we are now engaged. We shall conclude our abstract of his observations by briefly citing his general inferences.

"The morbid changes which we have surveyed present many of the anatomical characters of inflammation; intense, general, diffused redness; in many cases tumefaction; and lastly, in passing to the chronic state, the formation of adhesions between the cortical substance of the convolutions and the contiguous membrane; besides this, adhesion of the different planes or layers of the cerebral substance to each other in a certain number of cases.

"If the simple redness, the perceptible tumefaction—if the general and partial softenings, the increased resistance which we have noted in acute cases, left any doubt of the true nature of the organic disorder, the adhesions observed so often in chronic cases certainly admit of none; and we are forced to allow that there exists in the brains of lunatics a state of true inflammation, unless we cease to regard the adhesions observed in other parts as undoubted traces of such a state, and refuse to admit that adhesions of the pleura, peritoneum, and pericardium, afford evidence of the former existence of pleuritis, peritonitis, and pericarditis.

"As the different traces of inflammation are more constant in the brain than in the membranes, it is necessary to conclude that the essential change has taken place in the brain, and that the change produced in the membranes is only accidentally complicated with it." In his remarks on this subject M. Foville plainly means to express his dissent from the opinions maintained by M. Bayle, who, in his treatise "*Des Maladies du Cerveau*," attributes insanity to disease of the membranes.

Among the morbid appearances of the brain, the varied changes of the cortical substance are the most constant in connection with symptoms of mental derangement. Although M. Calmeil maintained a different opinion, and was inclined to ascribe paralysis or the loss of muscular power to disease of the cortical substance, the facts on which he founded this inference do not, as M. Foville contends, warrant such a conclusion. In all instances of the general paralysis of lunatics which he has examined by dissection, there was, besides the change in the cortical substance, some alteration, either hardening, serous infiltration, or softening of the white substance; and in most cases, in addition to these appearances, there were adhesions of the principal planes of the cerebral substance to each other. A very remarkable case which occurred in the clinical course of M. Esquirol in 1823, affords strong evidence in favour of M. Foville's argument. The cerebrum of an idiot displayed the grey substance of both hemispheres in the last stage of atrophy and disorganization, while the white portion of the brain remained perfect on one side. In this person the intellect had been entirely defective, but the muscular power on one side only had failed. From this and similar observations M. Foville concludes that the function of the enervous portion of the brain is essentially connected with the intellectual operations, and

that of the fibrous or white structure with muscular action. His two principal inferences are expressed in the following terms:

1st. Morbid changes in the cortical substance are directly connected with intellectual derangement.

2d. Morbid changes in the white substance are directly connected with disorders in the motive powers.

The remarkable accuracy of these researches throws a strong shade of doubt, and even of improbability, over those recorded cases of maniacal disease in which *no morbid traces* were discovered in the anatomical examination. There is much reason for suspecting that a more exact scrutiny, and a careful comparison of the state of the parts with the appearances displayed by the same organ in a natural and healthy condition, might have led, in some of these instances, to the detection of morbid lesions greater or less in extent. Yet it is not improbable that degrees and modifications of maniacal disorder have taken place, in which such changes might have been, in an early stage, hardly to be traced *with certainty*. In cases of insanity displaying no general disturbance of the intellectual operations, and principally consisting in a morbid state of the temper and affections, and in recent examples of monomania, we should not expect to find strongly marked changes in the brain, and there is indeed but little proof that the brain is in some of these cases diseased. And where there is more considerable disorder in the functions of the brain, arising secondarily or by sympathy with the state of other organs, the traces of such disorder may be very evanescent. It has likewise been remarked by M. Foville, that in some accidental affections of the maniacal class, succeeding the action of debilitating causes, as in the puerperal state, nothing has been discovered in the brain more striking than its extreme and general paleness, and that, although there are in these instances some mottled appearances of a light red or rose colour on the cortical substance, such changes are too slight to be considered as idiopathic. The same writer adds that in the small number of cases of this description which he has had an opportunity of examining, the disorder in the brain has appeared to him to be sympathetic of some deeply-seated disease of the uterus or abdomen. In general, however, the fact is unquestionable that insanity depends upon organic lesion of the brain, and we have sufficient reason to conclude that this lesion is, in its commencement, a degree or modification of inflammatory action.

SECT. VI.—*Treatment of madness.*

Division of the subject. Moral and medical treatment.—The proximate or immediate cause of mental derangement is so much concealed from our research, the phenomena of the disease are so complicated, and the morbid states of the constitution with which they are connected so various, that we might foresee no ordinary difficulty in the attempt to lay down, with respect to this class of disorders, any gene-

ral principles or indications of cure. In reality this task has been found to be a more arduous one than even the circumstances adverted to would have led us to anticipate; and hence many writers have given it up, and rest satisfied with stating as merely experimental results the effects which particular remedies have been thought to produce.

It is usual to divide under two heads the different means which suggest themselves to our consideration for the cure of madness, and to take up separately what relates to the moral treatment of the insane, or the means supposed likely to exercise a beneficial influence on the mind; and, secondly, the medical or therapeutical remedies, properly so termed. As this mode of arrangement is attended with some advantages, and as no practical objection has been raised against it, we shall keep it in mind in proceeding to the subjects now to be considered, beginning with the medical or therapeutical treatment of insanity.

Medical treatment of insanity.—The medical treatment of insanity may be referred in a great measure to two indications or principles, which in many cases may be followed more or less fully, and will in general serve the purpose of associating in the mind the different curative attempts which may be made with some hope of success. There are, indeed, instances of the disease to which these indications are either inadmissible, or can only be adopted in a very limited extent; but such cases may be considered as exceptions.

I. The first indication is to remove or lessen that diseased condition of the brain on which we have reason to believe that madness is, in some part at least, dependent.

That the diseased condition of the brain here referred to is nearly allied to inflammation, that all its essential pathological characters are those of inflammation, may be concluded from the following considerations.

1. The morbid appearances displayed by anatomical researches in the brain and its investments are, as we have seen, generally referable to the immediate results or more remote vestiges of inflammatory action. On this head we shall add nothing to what has already been said in the last section, and refer the reader particularly to the facts there accumulated, and the concluding remarks upon them.

2. The relations of madness to other diseases, which are known to be connected with increased vascular action, or at least with increased fulness in the vessels of the brain, tend to support the same inference. The connection of apoplexy and paralysis, of epilepsy and of other cerebral diseases, with madness, has been pointed out by medical writers. These diseases are occasionally converted into each other, or mutually succeed each other, and undergo alternations. They display such a relation as leads us to believe that the proximate causes or the morbid changes on which the symptoms immediately depend, are in all analogous. Therefore, as some of the class, apoplexy for instance, and paralysis, are connected with vascular fulness in the brain, it is hence probable that a

state not far removed from this, and at least likely, under the influence of slight causes, to pass into it, gives rise to the phenomena of madness.

The metastasis of inflammatory diseases from other parts of the body, among which is included the recession of cutaneous eruptions, is well known to be followed not unfrequently by the appearance of maniacal symptoms. Suppressions of catamenia and other discharges, giving rise to similar diseases, strongly confirm the same pathological principles.

3. The causes in general which excite madness bring us to the same conclusion. These are principally of a description likely to give rise either to inflammation in the brain, or to a full and distended state in the vessels of that organ. Exposure to severe heat or cold, insolation, concussion or other injuries of the head, intoxication, and generally excess in the use of stimuli, great mental excitement, are all of this class; the condition of the brain, which it is the tendency of these agents to promote, is either inflammation, or something bordering upon it.

These different considerations concur in rendering it probable that the actual condition of the brain which immediately gives rise to the phenomena of madness, is in general one of high vascular excitement or turgescence, a state which, if it does not really constitute inflammation, is at least closely bordering upon it, and so liable to pass into it, that all the usual consequences of inflammation in many instances arise from it.

But though we may be correct in drawing this inference as a general one, there are great difficulties to be overcome, and much remains to be proved, before we can be authorized to insist upon it as universally applicable. The phenomena of mental disease are so various, and even so diverse, that they may be thought, not improbably, to arise from very different states of the system. There are instances of mental disease conjoined with so much atony and debility, subsidence of vascular action, coldness of surface, and diminished secretions, as to indicate a very different state from that of inflammation. Anatomical researches display in these instances a pale discoloration of the brain, with abundance of serous fluid, softenings of substance, and other phenomena of a similar description. Here we trace a state different from inflammation, though perhaps its remote consequence.

Are there not, likewise, cases in which we are scarcely authorized to conclude that any disease of the brain has ever existed? Instances of moral insanity, in which obliquity of character exists through life, and scarcely ever amounts to aberration of intellect, and some cases of monomania, in which slight and transient hallucinations supervene upon moral obliquities of the same description, and appear at intervals, cannot perhaps be referred with any degree of probability to an active state of disease in the encephalon.

It is probable, on the whole, that such exceptions bear a small proportion to the number

of cases to which the preceding remarks on the pathology of madness are applicable.

If these remarks are well founded, they lead at least to one practical indication for the general treatment of madness. In proceeding with the medical treatment of maniacal diseases, we shall do well to bear constantly in mind the probable condition of the brain, and to direct our practice more or less with a reference to it.

Yet we must not omit to observe that the physician who proceeds to treat cases of madness as instances simply of inflammation in the brain, and who expects to cure it at once, like any other local inflammatory disease, by the direct operation of antiphlogistic means, will very often find himself greatly disappointed. He will meet with many cases in which no perceptible benefit arises from bleedings, evacuations of all kinds whether general or locally applied, and combined with the whole series of remedies supposed to be required by the existence of organic inflammation. Many patients will sink under such a course of treatment if carried on incautiously: it will leave the disease undiminished, and exhaust the powers of life. This depends, perhaps, on the influence of diseased states in other structures and organs, or on disordered functions of other parts which are complicated with, and in some instances give rise to, the disturbance existing in the brain. Inflammatory excitement is a part of the disease, but does not entirely constitute it, even in so far as the brain is concerned.

Perhaps we may venture on the assertion, that there are few instances of madness in which the practical indication arising from the view which we have taken of the pathology of this disease will not be found applicable during some periods of the case, though in many its application is very limited. The degrees in which it is admissible are very various.

In recent cases of mania, properly so termed, and of incoherent insanity, particularly in young and plethoric subjects, and where the disease has made its attack suddenly, and is accompanied with signs of considerable vascular excitement, much may be hoped from the antiphlogistic treatment, at least from certain parts of it judiciously modified. We shall now consider the different means of which it consists, and advert to the opinions of some of the most eminent practical writers with respect to their use in cases of insanity.

1. *Of bleeding.*—Cullen recommends bleeding in the early stage of madness. He says that it has been common to employ this remedy in all cases of recent mania, and, as he thinks, with advantage. He observes that when the disease has subsisted for some time, he has seldom found bloodletting to be of service. "It is," he says, "a proper and even a necessary remedy in those instances of madness in which there is fulness and frequency of pulse, and when marks are observed of increased impetus in the vessels of the head." He prefers bleeding from the arm, while the patient remains in somewhat of an erect posture,

and bringing on a degree of deliquium, which, he says, is a pretty certain mark of diminished fulness and tension in the vessels of the encephalon.

Pinel, whose authority could not fail to produce an impression, is in this respect decidedly opposed to Cullen. He considers the signs of vascular plethora in the head, or of determination of the blood thither, as very deceptive; and although he allows bleeding to be in some instances capable of averting attacks of recurrent madness when they are anticipated, he carefully abstains from the use of the lancet after the disease has actually broken out. Care is always taken, he says, to question the relatives of patients admitted into the hospital over which he presided, whether bleeding has been practised, and if so, what were its results. "The reply always proves that the state of the patient has changed for the worse immediately after bleeding." Pinel held very firmly the opinion that bleeding, even in maniacal cases which are accompanied by circumstances supposed to indicate plethora and local determination to the head, tends to retard recovery, to render it more doubtful. He is even persuaded that bleeding gives to the disease a tendency to degenerate into dementia or idiotism. The facts, however, which this distinguished author adduces as proofs of his opinion, afford, as M. Foville has remarked, but very equivocal evidence. "Two girls," he says, "nearly of the same age and temperament, were admitted into the hospital (the Salpêtrière) on the same day: one of them, who had not been bled, was cured in the space of two months; the other had undergone a copious bleeding. She sank into a state of idiotism, or rather of dementia, and did not recover the faculty of speech till the fifth month. Her perfect restoration took place at the end of the ninth month." Now, as most authors fix the mean duration of madness at the period of several months, and some at more than a year, this case of recovery at the end of the ninth month cannot afford a strong condemnation of the practice pursued. Another case, which the same author has adduced as affording evidence against bleeding, is not more conclusive in respect to the influence of remedies on the ultimate event of the disease. Yet the opinion of such a writer, founded as it was, at least by himself supposed to have been, on extensive observation, ought not to be entirely disregarded because he happened to select but dubious illustrations. If bleeding occasions a state of collapse in the system, and is carried beyond what is necessary to reduce an over-excitement, a fatuous dejection of mind is likely, in some cases, to be the result.

M. Esquirol coincides with Pinel in the opinion that the diseased state on which mental derangement depends, is sometimes changed for the worse by bleeding. He says that he has seen madness increased after an abundant flow of the catamenia, and likewise after one, two, or three bloodlettings. In such cases melancholy dejection has passed into furious madness. Yet M. Esquirol approves of mo-

derate bleeding in plethoric cases, and where some habitual sanguineous evacuation has been suppressed. He has often with advantage applied leeches behind the head or to the temples of patients who are subject to sudden determinations of blood towards the head. His favorite remedies in such cases were the use of a few leeches at a time, repeated as often as necessary, and cold applications to the head.

To outweigh the authority of those writers who either condemn the practice of bleeding in madness, or allow of its adoption in so sparing a degree, strong evidence is requisite, but such evidence we possess.

Dr. Haslam says that bleeding is the most beneficial remedy that has been employed in madness, and that it is equally beneficial in melancholic as in maniacal cases. He limits its use to recent cases and plethoric habits, and directs it to be performed by the application of six or eight cupping-glasses to the shaven scalp. The quantity of blood to be taken must depend on circumstances. "From eight to sixteen ounces may be drawn, and the operation repeated as circumstances may require." When a stupid state has succeeded to one of high excitement, Dr. Haslam considers bleeding as contra-indicated.

But Dr. Rush is the most strenuous advocate for bleeding in maniacal cases. He lays the greatest stress on this remedy, and has perhaps carried its use to a greater extent than any other medical practitioner of high repute. The arguments which he has given in support of the practice of large depletion in madness are the following:—1. The force and frequency of the pulse, the sleepless and agitated state of maniacal patients. 2. The appetite being unimpaired in lunatics, and sometimes even stronger than usual, a plethoric state of the vessels easily arises in such habits. 3. The importance of the diseased organ, the delicate structure of the brain, which prevents it from long supporting morbid action without being exposed to the danger of permanent disorganization. This danger, he says, is much increased by the want of sleep, the cries and exclamations, and the constant agitation of mad persons. 4. The want of any natural channel of discharge from the brain, by which the ordinary results of inflammation might be averted or got rid of, in that way by which serous discharges in other parts relieve the inflammatory state. 5. The accidental cures which have followed the loss of a large quantity of blood. Dr. Rush has seen several lunatics who had attempted self-destruction by cutting their throats, or opening the great vessels, cured by the abundant hemorrhages which have followed these attempts. 6. Lastly, he says that bleeding is indicated by the extraordinary success which has resulted from its use in the United States, and particularly at the hospital for lunatics in Pennsylvania.

Dr. Rush advises large bleedings at the first attack of mania. If the patient bears it without syncope, he ought to lose, according to this physician, from twenty to forty ounces of

blood. If possible, it should be taken from him while standing erect. Free bloodlettings practised early in the disease have, as he says, a surprising effect in calming the patient, and in many instances are sufficient for the cure unaided by any other remedies. In most cases, however, bleeding from the arm is to be followed by the application of leeches or cupping-glasses to the head or nape of the neck, by low diet, antiphlogistic remedies, refrigerants applied to the head, and the use of warm or tepid baths.

Dr. Rush was of opinion that the evacuation of blood ought to be carried to a greater extent in madness than in any other acute disease whatever. From a patient, sixty-eight years of age, he caused two hundred ounces of blood to be drawn in less than two months. Another patient of Dr. Rush lost four hundred and seventy ounces by forty-seven bleedings in the course of seven months.

We shall conclude this survey of the conflicting opinions of practical writers on the expediency of bleeding in madness, by the following observations of M. Foville, which are deserving of the most attentive consideration, and which in our opinion place the subject in the true point of view. He says, "Without ever having pushed the employment of this remedy so far as Rush and Joseph Frank, I confess that it appears to me to be one of those on the efficacy of which the greatest reliance may be placed. MM. Pinel and Esquirol have proved that the 'expectant method,' assisted by a few simple rules, and a moral treatment wisely directed, have succeeded in a great many cases; but although it is better to confine ourselves to the use of simple means, patiently continued, than to employ unadvisedly the method of interference, I believe that the physician devoted to the study of pathological anatomy can draw from the results which it furnishes, compared with the observation of symptoms, valuable therapeutic inductions; that he may place reliance on their efficacy, and recommend them with confidence when experience shall have demonstrated their good effects. Are not the anatomical characters which so constantly present themselves in acute cases, and the adhesions which are so frequent in chronic ones, evident proofs of inflammation? And hence, are we not authorized to hope for advantages from the use of antiphlogistic means?"

"If it be added," says M. Foville, "that in several hundred lunatics, whose bodies my situation for nearly ten years has given me an opportunity of examining, I have never found adhesions in acute cases, while they have been very common in chronic cases; if, with these facts, the results related in the works of MM. Bayle and Calmeil are compared, we may conclude, on seeing these adhesions so frequent in chronic cases, that they are incompatible with the regular exercise of an organ so delicate as the brain, and consequently incompatible with the return of reason. Hence we ought, in every acute case, to choose the most active means, in order to prevent this

melancholy termination of the cerebral disease.

"Such are some of the reasons which have led me to agree with several physicians who have been placed in circumstances favourable for making observations, that bleedings ought not to be entirely proscribed in the treatment of mental diseases. In the greatest number of cases of recent insanity which have been placed under my care, I have employed evacuations of blood, local or general, rare or frequent, abundant or in moderation, according to the strength of the patient, and the state of the pulse, the redness of the eyes, the heat of the head, the agitation and want of sleep. I have always preferred general bleeding, when there existed a state of plethora, which the force and frequency of the pulse evinced. In opposite circumstances, leeches on the neck, the temples, behind the ears, cupping upon the same part, and upon the shaved head, have produced decided benefit. Local bleeding having appeared to me to produce a marked effect upon the brain, I have often prescribed it at the same time with a general bleeding in the case where the intensity of the general phenomena has imperiously demanded the latter; but I have never rested exclusively upon the efficacy of sanguineous evacuations, although in many cases I have seen all the morbid symptoms disappear, as if by enchantment, under their use.

"I have under my care several patients subject for a number of years to attacks of intermittent madness, which, left to nature, would last three or four months, or longer.

"During three years, that is, since they have been confided to my care, they have not experienced a single attack of a month's duration. Often in the space of five or six days all the symptoms have been dissipated. General or local bleedings proportioned to the intensity of the symptoms, warm baths with cold applications to the head at the same time, are the means by which I have constantly averted the attack.

"I have several times prevented the return of these attacks by employing the same treatment, as soon as the redness of the eyes, the heat of the head, and wakefulness manifested themselves, even when there had been no delirium."

The writer of the present article having superintended during nearly twenty years a receptacle for maniacal paupers, has possessed adequate opportunity of forming an opinion on the ground of his own experience as to the efficacy of different remedies, and among other practical questions with reference to the treatment of insanity, as to the extent to which bloodletting is advisable in this disease. The results of his own observation lead him to doubt the propriety of the copious blood-lettings of which Dr. Rush is the advocate. He believes the cases of madness to be comparatively few, which can be cured at once by large depletions, and is sure that considerable danger to the existence of the patient would often be incurred if such a practice were

generally pursued. At the same time he is equally convinced of the propriety of moderate detractions of blood, as advised by Cullen, Haslam, and Foville. This remedy ought by no means to be neglected in cases of madness which have come on rather suddenly and with acute symptoms, unless some circumstance in the age, habit, or temporary condition of the patient, renders it unsafe. It is especially called for in young and in plethoric subjects; when the disease is one of great excitement; when there is constant agitation and want of sleep, and in such cases it should be adopted before these causes have induced exhaustion and collapse; when there are marks of determination to the head, such as full and throbbing carotids and temporal arteries, redness of the face and conjunctiva, heat of the scalp, a contracted pupil, intolerance of light or of sounds, headach, vertigo, startings, agitations, or convulsions. We are not to look for an aggregate of these symptoms before we prescribe bleeding, but more or fewer of them often occur to direct our proceedings. Less frequently we find the still stronger indications of which even M. Esquirol allows the force as pointing out the necessity of bleeding. We allude to the circumstance that the disease has arisen from the sudden suppression of catamenia or of some morbid but, perhaps, also salutary discharge, from the disappearance of eruptions, or from the operation of powerfully exciting causes. Among these is the abuse of stimulating liquors. Madness, which is the effect of intoxication, requires antiphlogistic remedies, and bleeding cannot be dispensed with; but care must be taken not to carry depletion too far in cases arising from this cause which assume in some degree the character of delirium tremens. We have reason to believe that patients labouring under delirium tremens have been killed almost instantaneously by large bleedings, which had been ordered by practitioners who were unaware of the nature of the case. This, however, is a form of disease easily distinguishable from ordinary madness resulting from intoxication. It is frequently advisable to bleed once or twice from the arm to the extent of fourteen or sixteen ounces, and afterwards, if the indicatory symptoms continue, to apply cupping-glasses to the scalp, after it has been shaved, and repeat this operation or the application of leeches as often as the degree of excitement and signs of vascular fullness, the circumstances of the patient otherwise admitting, seem to require.

Many practical writers have insisted on the necessity of bleeding in the early stage of madness, without advertent to the important advantages which are to be derived from the same remedy in the after periods of the disease. These, however, are highly important. The practice of bleeding to a small extent, either from the arm, or, what is commonly preferable, by cupping-glasses applied to the scalp or the nape of the neck, and repeating the operation in some instances periodically when the tenor of symptoms has been nearly uniform, or

occasionally when the patient has been subject to fits of increased excitement, has appeared conducive to ultimate recovery in a great number of instances. When suppression of the catamenia or of hemorrhoidal evacuations have preceded the attack, cupping on the sacrum or the application of leeches to the hemorrhoidal vessels may perhaps best supply the defect of the natural or habitual method of relief.

The other resources, which are comprised under the antiphlogistic treatment of madness, will require a much less extensive consideration.

Shaving the head should always be done when there is much vascular excitement and heat about the scalp. By the coolness afforded on the removal of the hair, more benefit and a greater degree of tranquillization is often produced than is anticipated. Cutting the hair short is not sufficient: the head should be shaved once or twice in a week.

Blisters, setons, caustics, irritants of various descriptions, have been applied to the head and the nape of the neck in cases of madness, as well as in other diseases of the brain.

While acute symptoms are present, with heat of the head and irritation of the general system, cold applications are preferable to blisters; but when these indications are not prominent, and when there is rather a tendency to stupor than excitement, blisters on the head are frequently of service. They have been applied in most cases to the nape of the neck with some advantage, particularly when, as it has often happened, the discharge which follows their application has been very considerable.

M. Esquirol has remarked that blisters, cuppings, and other irritating applications, are used successfully in cases which follow a metastasis; in monomania accompanied by stupor; in puerperal madness; and in dementia when not complicated with convulsions or paralysis.

Issues and setons in the neck have been often tried, but the general result of experience is not favourable to their use. They afford little benefit in maniacal cases. In dementia connected with paralytic affections, they are more likely to be of service than in mania attended with excitement. In the ordinary chronic state of madness, these remedies are found to be rather injurious than beneficial.

Irritating ointments have been applied in many instances, particularly since their use was strongly recommended by the late Dr. Jenner. Medical practitioners have been generally disappointed in their expectation of benefit from this attempt. It is most likely to be successful, as hinted by M. Esquirol, in cases of metastasis.

Cold water and bathing.—Cold shower-baths, and affusions of cold water administered in various methods, have been extensively tried in maniacal diseases. Dr. Rush considered them to constitute a very important remedy, and recommended, in order to obtain the

greatest advantage from them, that they should be repeated two or three times in a day. M. Esquirol used this remedy with advantage in some cases; he chiefly prescribed it for young subjects. M. Foville says that he was a witness to an almost immediate cure of a maniacal girl of delicate constitution and nervous temperament, who was subjected by M. Esquirol to the affusion of cold water at the degree fourteen of the centigrade thermometer. She was placed, with a garment covering her, in an empty bathing-tub, and water was poured in small quantities on her head till it covered her body, and shivering ensued. On a second application of this method, which was for some time resisted, it was followed by deep sleep, accompanied by copious sweating; and when the patient awoke, she was found to have recovered her reason.

The method of bathing adopted by M. Foville in the hospital under his management is free from the inconveniences and occasionally injurious results attendant on cold affusions. He places a cap or bonnet, containing ice and closely fitting, on the head of the patient, and keeps the body immersed in a warm-bath for two or three hours, and renews this proceeding twice or three times in a day, according to the intensity of symptoms. On adopting it, as he was accustomed to do at first, only once in a day, he found the tranquillity produced by it followed not unfrequently by increased agitation; but on repeating the bath, with the ice constantly applied to the head, he has frequently succeeded far beyond his expectation. It has been the apparent means of recovery in many acute cases, and has produced sleep and tranquillity in frequent instances of obstinate restlessness and agitation.

The use of the shower-bath is often followed by reaction, when the patient, if excitable, becomes violent. In old cases, attended with a disposition to congestion of blood in the head, its use is precluded by the danger of producing paralysis. It is chiefly serviceable in young subjects; when the constitution is relaxed, and when it is predisposed to hysteric affections.

Applications of ice, or, when more convenient, of cold water, are very generally serviceable in cases attended with heat of the head and irritability.

Warm or tepid bathing has been found advantageous in the treatment of madness under a variety of circumstances. A cold state of the skin, languor of the general circulation, indicated by coldness of the extremities, a tendency to chronic eruptions, are among the phenomena which suggest its adoption. Sometimes it produces sleep after long-continued agitation. If the degree of heat be not such as to produce too much vascular excitement, it is generally an useful and safely applicable remedy.

Purgatives.—No fact in medical practice has been longer established than the utility of purgatives in madness; witness the fame of

Antieyra and hellebore. To confirm a maxim so well supported by the result of constant experience, it seems almost superfluous to adduce pathological facts. It is not, however, difficult to find this species of evidence in its favour. Many authors have remarked that spontaneous cure of madness has resulted from a supervening diarrhœa, in which the intestines have discharged in great quantities a variety of morbid secretions.

M. Esquirol has well observed that purgative medicines ought not to be used indiscriminately in all cases of madness, and that they are injurious when the mucous membrane of the intestinal canal is in a diseased state. This is the case in many instances of insanity. We shall, under another indication for medical treatment, consider the method of practice which is advisable in different states of intestinal irritation, as they occur in madness. At present it will be sufficient to observe that, unless any signs of disease exist in the structure of the alimentary canal, such as inflammation or ulceration of the mucous coat of the intestines, the use of purgative medicines is one of the most important and generally available means for the cure of maniacal patients. The mildest cathartics are preferable to others in most instances, because their use can be long continued without injury to the structures on which they immediately act. The neutral salts, infusion of senna, rhubarb, jalap, castor-oil, are in the majority of cases sufficiently powerful, and may be used daily or frequently according to circumstances. When there is decided tendency to constipation, or the alvine evacuations are morbid, calomel, scammony, colocynth, or croton oil, may be added, due attention being paid to the cautionary circumstance above pointed out.

Emetics.—Emetics have been strongly recommended by some practical writers. M. Esquirol says that he has found them useful in most cases of melancholy accompanied by a torpid state of the system. Dr. Rush considered them to be chiefly indicated in hypochondriasis, or lowness of spirits connected with dyspeptic disease. Haslam confirms their utility in cases attended with disorder of the stomach, merely with a view to the relief of that particular symptom, but he declares that, “after the administration of many thousand emetics to persons who were insane, but otherwise in good health, he never saw any benefit derived from their use.” “Perhaps no one,” he says, “has enjoyed a fairer opportunity of witnessing the effects of remedies for insane persons than myself; and when emetics are employed in Bethlem Hospital, they have the best chance of effecting all the relief they are competent to afford, as they are given by themselves, without the intervention of other medicines; and this course of emetics usually continues six weeks.” “It has been for many years the practice of Bethlem Hospital to administer to the curable patients four or five emetics in the spring of the year; but on consulting my book of cases,

I have not found that such patients have been particularly benefited by the use of this remedy. When the tartarized antimony given with this intention operated as a purgative, it generally produced beneficial effects.” The most strenuous advocate, in late times, for emetics in madness is Dr. Cox, whose work on that disease contains many excellent practical observations. This author goes so far as to say, that, “in almost every species and degree of maniacal complaints, from the slightest aberration of intellect that accompanies hypochondriasis, to the extreme of mania furibunda, emetics have proved a most valuable and efficacious remedy.” Dr. Wake, physician to the York Lunatic Asylum, has assured the writer of this article, that, after extensive experience in the use of different remedies on the patients of that hospital, he has found no other class of remedies so frequently efficacious as emetics.

The use of emetics in madness requires caution. Dr. Haslam says, that, “in many instances, and in some where bloodletting had been previously employed, paralytic affections have within a few hours supervened on the exhibition of an emetic, more especially where the patient has been of a full habit, and has had the appearance of an increased determination to the head.” As it is well established that lunatics are very subject to attacks of apoplexy and paralysis, this circumstance ought always to be taken into consideration in the prescribing of emetics to maniacal patients. The use of medicines of this class is precluded by the signs of a plethoric habit and cerebral congestion; but, as MM. Esquirol and Foville have well observed, they are likely to be of service, and this probability is confirmed by ample experience, in cases of melancholy or hypochondriacal dejection attended with stupor, and where the languid state of the functions, both animal and physical, appears to require the use of remedies which are fitted to excite new actions, and to stimulate the secretions of the abdominal viscera. It may be added that emetics are sometimes useful during a state of furious excitement, and produce calmness and a mitigation of violence. Sometimes under these circumstances their exhibition is followed by a restoration of sleep and tranquillity.

Maniacal patients often require large doses of tartarised antimony, as from six to ten grains, before vomiting is excited; and this is especially the case when the remedy is given during a paroxysm of violent excitement. It is, however, better to begin with moderate doses, and to combine ipecacuanha with the preparation of antimony.

The use of antimony in nauseating doses is always safe, and very frequently beneficial in controlling maniacal excitement and the febrile state of the system which accompanies it.

Rotation.—The use of a rotatory swing, which occasions vertigo and nausea, and if continued a sufficient time, brings on vomiting with some degree of faintness, was suggested, chiefly

from a theoretical notion, by Dr. Darwin. The beneficial effects of this remedy have been supported on the ground of experience by Dr. Cox. Some writers have ridiculed the idea of attempting such a remedy, and others have thought it difficult to imagine on what principle it can be of any service; but those practitioners who have put the proposal to the test of experiment have, if we are not mistaken, in most instances been convinced of its utility. Among these may be mentioned Dr. Wake of York, who has assured us that he has long considered the rotatory swing as a remedy of great efficacy. It was used by Dr. Cox in cases of violent maniacal excitement, and proved a powerful sedative. The nausea and sickness induced was found to quiet the patient and put a speedy termination to the paroxysm. It was not requisite in all cases to bring on vomiting. Quiet sleep often followed the use of this remedy.

The rotatory swing is also useful as a means of moral restraint. The effects are so disagreeable that the threat of repeating its use has a salutary influence upon turbulent and intractable patients.

2. *Second indication.*—The principle of medical treatment hitherto considered, which has respect to the physical condition of the brain in cases of maniacal disease, is chiefly applicable to the acute stage and early period of its duration. The pathological fact on which it in part is founded, may be usefully borne in mind in the subsequent progress of the complaint, and acted upon more or less when circumstances allow or require it, but it cannot, when the disorder has become confirmed, be the chief guide of the practitioner. The marks of determination to the head have generally, under such circumstances, in a great measure subsided. In these instances inflammatory action in the brain has probably given way to a state of relaxation bordering on serous effusion, or to other changes which imply rather the consequences than the existence of increased vascular action.

The second indication for the medical treatment of insanity, which has relation chiefly to the more advanced period and chronic aspect of such disease, is to restore and maintain, as far as it can be done, a healthy condition of the physical or natural functions, to obviate or remove disorders in other parts of the system, which may be connected or coincident with the diseased condition of the brain.

We have already observed that in a great proportion of maniacal cases there are symptoms of disturbance in the natural functions, and that diseases of the thoracic and abdominal viscera co-exist with that morbid state of the brain on which madness immediately depends;—that the former are in fact often the immediate causes of death. The relation in which these diseases stand to the cerebral disorder may be doubtful in many instances; in some it is the relation of cause, in others that of effect: even in the last instance there is a reaction of the secondary upon the primary parts in the series of morbid

changes, and the original disease is aggravated by its complication with an accessory one. By relieving the latter we obtain a proportional mitigation of the former. It is indeed a fact that many lunatics have been cured by a course of remedies adapted to the restoration of their general health. The writer of this article has often seen persons who had laboured for some months, or even years, under mental derangement, brought from poor-houses in the country, or from their private dwellings, in a state of emaciation and squalid wretchedness, suffering under various disorders which had become complicated with insanity, or had in some instances preceded it. These persons have been placed under medical treatment; care has been taken to relieve the symptoms of visceral disorder, to restore the functions to a healthy state, to afford them good and nutritious diet, and to remove complaints which occurred from time to time by occasional remedies. In many cases of this description, as the general health improved, the mental disorder has gradually lessened, and has finally disappeared. In the course of four, five, or six months from the period of their coming under medical treatment, very many patients of this description have been restored to their usual state of health, and to the exercise of their customary occupations, after having undergone the operation of few remedies except such as are adapted to the indication or principle of practice now pointed out.

The mode of treatment required in following this indication must vary according to the state of the constitution and the modifications of disease which particular cases may present.

In examples of madness complicated with intestinal disorder, care must be taken to relieve the latter by the various remedies and modes of diet and regimen which the disorder of the intestinal canal and its function require. A torpid state of bowels must be overcome by the use of mild aperients, continued daily, or given occasionally according to circumstances. When constipation has given way to diarrhoea, with tenderness, abdominal distention, with or without occasional symptoms of dysentery, with emaciation, coldness of the skin, general debility, a disposition to eruptions resembling those of scurvy or purpura, the cure can only be promoted by a careful attention to a variety of particulars. The action of the bowels should be restrained by absorbent medicines, combined with slight opiates and mercurial alteratives. The use of the warm bath, warm clothing, and a warm atmosphere, a mild and nutritious diet, should be enjoined at the same time. Bitters, vegetable tonics, and aromatics may be given to support the strength of the stomach and promote digestion: a liberal allowance of animal food, and sometimes malt liquors, and even a little wine are used with advantage in cases of debility and exhaustion when the digestive powers will bear their use.

When the actions of the intestinal canal are irregular in chronic cases of madness, without giving rise to so great a degree of disease as in the instances above indicated, a healthy state

of their function is sufficiently promoted by giving mild aperients, with bitter and neutral salts, two or three times in a week, and occasional doses of calomel.

When madness has been the result of, or has been accompanied by, diminution or loss of any other natural function or habitual process, an effort should be made to restore it. If we were possessed of any certain emmenagogue, it is highly probable that its successful application would in many cases promote the cure of maniacal diseases connected with the suppression of the catamenia. When habitual discharges from the hemorrhoidal veins have been coerced, or have ceased spontaneously, derangement of the health has ensued similar to that occasioned by uterine suppressions. The want of this latter process seems to be more easily supplied by the powers of art than that of the uterine function. M. Foville has mentioned a case which occurred to M. Esquirol, in which paralysis became complicated with madness in consequence of the suppression of an habitual hemorrhoidal discharge. The application of a single leech to the hemorrhoidal veins every day during a month was followed by a restoration of the flux, and the patient was cured of his complaint.

Attempts to restore the catamenia when defective in maniacal patients, as they very frequently are, seldom produce in a speedy manner the desired result. If any effort is perceptible at particular times to set up the periodical discharge, it should be promoted by small bleedings; by the application of leeches to the inguinal region or the thighs, or by cupping at the loins, together with the use of the hip-bath, pediluvium, general warmth of clothing and atmosphere, warm drinks, with doses of castor, camphor, and other odorous stimulants. At other times aloë, rhubarb, and aromatic bitters should be given daily by way of preparation.

Digitalis has been reckoned by some practitioners, particularly in Germany, as almost a specific in maniacal cases. Dr. Cox speaks favourably of its effects. By M. Foville its use is very judiciously limited to those instances in which disorder of the brain is coincident with, and, as he supposes, dependent upon disease, or at least increased action, of the heart, and particularly increased fulness and pulsation of the carotid and temporal arteries.

Opium and narcotics are *generally* injurious in madness. Their use is condemned by most practical writers. Occasionally, however, opium has been of decided benefit. Dr. Hodgkin has witnessed two cases of madness with a strong propensity to suicide, in both of which a strong dose of opium procured sound sleep, followed by a restoration of health. The use of opium requires great caution in maniacal diseases. No precise rules are determined by which we can judge of the propriety of its use.

The use of mercury has been highly recommended in madness by several writers, and particularly by Dr. Rush. Mercury is by no means a general remedy for maniacal diseases; but in cases of torpor, with suppression or a very scanty state

of any of the secretions, mercury is frequently employed with great advantage. It should be used in mild alterative doses, and discontinued as soon as the gums become slightly affected.

Attention to diet and regimen are fully as important for the fulfilment of the last-mentioned indication as any remedy whatever. In exhausted subjects, as before hinted, great advantage is obtained from the use of a liberal diet. A plentiful allowance of animal food of the most wholesome and digestible kind, with malt liquor, and in some instances a small portion of wine, is required. The adoption of a liberal diet is not only free in such cases from any exciting or too stimulant influence, but even appears to calm the irritation which previously existed. But no rule respecting diet can be laid down that must not be subject to modification in particular circumstances, and according to the peculiarity of the case and the state of the constitution.

Fresh air and exercise, for those patients who are in a condition that renders them fit for it, are among the most important restorative means. Every asylum for the reception of lunatics ought to be provided with the means of affording regular employment in the open air to all the patients who are able to undertake it. Gardening and various agricultural works should as much as possible occupy their time at stated periods of the day, and by system and judicious management a great majority among the inmates of these receptacles may be brought into the habit of devoting themselves mechanically to such employments. M. Esquirol remarks that the best effects have resulted from the employment of these methods. They are followed with the greatest advantage in several lunatic asylums, both public and private, in different parts of England.

Of the moral treatment of insanity.—We now proceed to the second division of the subject under consideration, viz. to the moral treatment of insanity.

The moral treatment of this disease has by many writers been made to include a variety of methods proposed with the hope of inducing, by an unexpected and powerful influence on the feelings of deranged persons, a salutary change in the state of their minds. These are either motives addressed to their passions, or a variety of ingenious schemes or stratagems for convincing them of the falsity of their hallucinations, and surprising them into a recognition of their erroneous impressions. It has been proposed to indulge the illusions of the insane to a certain degree in order to overcome their false notions by striking and undeniable proofs. We are told that a lunatic who fancied that he had a serpent in his stomach, was cured by giving him an emetic, and adroitly producing a reptile, as if it had been thrown up during the operation of the medicine. Even such writers as M. Pinel and M. Esquirol, otherwise so enlightened and so judicious, appear to lay some stress on attempts of this description. The latter had a patient who fancied that she had a little animal in her head: her

physician encouraged the idea, and proposed an operation; an incision was made on the scalp, and an insect produced: the patient was immediately cured. A lunatic mentioned by the same writer refused to eat; he had made a vow, and was bound in honour to abstain from food. After many days employed in the attempt to persuade him of his mistake, a pretended order was brought, signed by his sovereign, which commanded him to break through his resolution, and promised him a guarantee against any reproach on that account: after a moral struggle of some hours, he gave way with reluctance, took food, and was restored. Another individual, who had become insane in consequence of the political events of 1813, was informed of the revolution which occurred in the following year. He refused to believe. M. Esquirol led him into the midst of the foreign troops which surrounded Paris. He was convinced, and almost immediately cured.

It is barely within the sphere of possibility that a conjuncture may occur in the treatment of an insane person, when an attempt may be advisable to destroy his hallucination by some practical and striking proof; but, generally, attempts to convince lunatics that their impressions are false, and that they labour under mental disease, either by reasoning or by any contrivances, are abortive, if not injurious. The moral treatment which such cases actually require is of a very different kind.

The most important question which relates to the moral treatment of the insane turns upon the propriety of secluding them, and separating them from their families and from society. This is a subject which of late has excited much attention and serious consideration, both among medical practitioners and other persons in England. It has likewise been examined in every point of view by writers of just celebrity on the continent; M. Esquirol and M. Georget in particular have considered this subject in all its bearings, and have expressed their sentiments upon it with great perspicuity and soundness of judgment. We shall avoid all suspicion of prejudice or erroneous bias by citing the observations of these writers, whose authority will carry greater weight than that of most other individuals, removed as they have been from the influence of circumstances which have given rise to controversy and unreasonable varieties of opinion.

"The first question," says M. Esquirol, "that presents itself in connection with the moral treatment of lunatics, relates to their separation. Ought every insane person to be withdrawn from his accustomed habits, from his usual manner of living, separated from the persons with whom he habitually lives, to be removed into a place which is unknown to him, and confided to the care of strangers? All physicians, English, French, and German, agree upon the necessity and the utility of separation. Willis, to whom we have so long and with so much advantage resorted in England to obtain a cure in cases of insanity, has remarked that strangers were restored much more often than the English. We can make

a parallel observation in France. Cures are more frequent among the invalids who come to Paris to be treated there, than among those who reside in the capital. The latter have not been sufficiently isolated.

"The first effect of separation is to produce new sensations, by presenting new objects, and breaking the train of ideas which has laid hold on the mind; these new objects strike, arrest, and excite the attention of the lunatic, and he becomes more accessible to advice which may be the means of restoring him to reason. Thus the first moment in which a maniac is separated from his friends is always followed by a remission of the complaint, which is important for his physician, who, then finding the patient without prepossession, can more easily acquire his confidence.

"It is principally upon the disorder of the moral affections that the necessity of separation depends.

"The disturbed state, the exaltation of ideas of the insane patient, puts him in contradiction, not only with those who live with him, but even with himself. He persuades himself that his friends are determined to oppose him, because they do not agree with his excesses and extravagances. Not understanding what is said to him, he is impatient; generally he misinterprets the words that are addressed to him; proofs of the most tender affection are taken for reproaches, or for enigmas that he cannot understand; the most anxious cares are only intended to vex him; his heart cherishes only sentiments of defiance; he becomes timid and gloomy; he fears every one who approaches him; his suspicions extend to persons who had been most dear to him. The conviction that every person is intent upon opposing him, defaming him, rendering him miserable, destroying and ruining him, puts a completing stroke to this moral perversion." Thence arises that "symptomatic suspicion which increases under indispensable contradictions, which augments in strength as the intellectual faculties weaken, and which is painted so strongly upon the physiognomy of all insane patients."

"With these moral dispositions, if you leave an insane person in the midst of his family, the affectionate son, whose happiness consists in the society of his father, will soon desert the paternal roof. The despairing lover believes that he can, by his councils, bring back the wandering reason of her to whom he is devoted; he has the misfortune only to render the wound still deeper. The object of his affection soon sees in him only a perfidious traitor, who affects such eager anxiety the more easily to betray her. The tender and sincere friend hopes by affectionate cares to restore that sensibility and that reason which have been the source of his attachment and happiness. In a short time he will find himself included in the general proscription, and his cares will only appear to the afflicted person proofs that he has been corrupted by enemies. What hope can we entertain if we do not immediately change the situation of these

unfortunate persons, who are so strongly prepossessed? And who has not felt the difference that there is in being deceived, opposed, and betrayed by our nearest relations and friends, and by individuals who are altogether strangers and indifferent to us? Another unhappy person becomes, all at once, lord of the world, dictates his sovereign commands to all that surround him; he persuades himself that he is blindly obeyed by all those who have been accustomed to yield to his will through respect or affection. His wife, his children, his friends, his servants, are his subjects; they are all obedient, for how dare they be otherwise? He is in his own territory; his commands are despotic; he is ready to punish with the greatest severity whoever shall dare to make the least remonstrance. What he requires may be impossible—it is of no consequence: should the commands of the potentates of the earth meet with invincible obstacles? The affliction of his family, the chagrin of his friends, the anxiety of all, their deference to his will and caprices, the repugnance that each evinces to oppose him from the fear of exasperating his fury,—all contribute to confirm him in his silent possession of power and dominion. Withdraw him from his pretensions, transport him far from his house, from his empire,—removed from his subjects, surrounded by new scenes, he will collect his ideas, direct his attention to himself, and place himself on an equality with his companions.

“Very often the cause of mental derangement is to be found in domestic causes. The malady takes its rise from chagrins, from family dissensions, from reverses of fortune, from privations, &c.; and the presence of relations and friends increases the evil, often without their suspecting that they are the first cause of it. Sometimes an excess of tenderness seizes the patient; a husband persuades himself that he cannot make his wife happy; he forms the resolution of flying from her, and threatens to put an end to his existence, since it would be the only means of securing her happiness. Her tears, her melancholy countenance, are so many new reasons for persuading this unfortunate person that he can do nothing better than commit suicide.

“Sometimes the first commotion given to the moral and intellectual faculties has arisen in the home of the insane person, in the midst of his relations and friends. All these external circumstances being associated with the first attack and the disorder which followed, will often contribute to keep alive and foster the hallucination,—a phenomenon which easily explains itself, since ideas recur simultaneously with certain impressions, when these impressions and ideas have often been associated, or even when they have been connected, only once, but with remarkable force and energy. It is generally remarked that insane people feel an aversion towards certain individuals, without the possibility of diverting them from this feeling. The object of their hatred is almost invariably the person who before the attack possessed their tenderest affection;

hence it is that they are so indifferent to their relations, and oftentimes so dangerous; while, on the other hand, strangers are agreeable to them. The presence of strangers suspends the delirium of the insane, either by the influence of new impressions, which is always useful, or from a secret feeling of self-love, which induces lunatics to conceal their state of mind. I have seen patients appear quite calm before their physician and strangers, while they were at the same time abusing their relations or their friends in an under voice.

“Such are the obstacles and inconveniences that present themselves when patients are put under medical treatment, if they continue to live with their families; and such are the advantages that will accrue from their being placed in a house appropriated to their treatment, where they are surrounded by new circumstances and confided to the care of strangers.

“Under what circumstances ought they to be confided? We have already said that they ought to be placed in a house appropriated for the treatment of insane persons. We prefer such a house to a private one, where patients may be confined at a great expense. Such partial separations rarely succeed: they possess many of the inconveniences which it is desired to avoid in leaving patients in their own habitations, and they present very few of the advantages of a house destined to receive a number of individuals. The strongest objection against separation or the placing patients in a lunatic asylum, arises from the distress which it is feared the patient will suffer when he observes that he is surrounded by companions in affliction. I reply that, generally, this does no injury to the patient, that it is not an obstacle to the cure, and that it oftentimes contributes to promote recovery. It leads maniacal persons to reflect upon their own state; and while ordinary objects make no impression upon them, they are diverted by the extravagances of their associates. The presence of their companions may serve as a text to the practitioner who wishes to act upon their imagination. The weariness of confinement, the desire of being at liberty, the wish of seeing their relations and friends, are so many means of drawing their attention outwardly: to be occupied with what passes around them, and in some manner to forget themselves, is a step towards recovery. However, there are cases where separation, as all other useful things, may be injurious to patients, when it is not modified with reference to the susceptibility of the individual, the character of his delirium, his passions, his habits, his manner of living. We ought never to lay down absolute rules in practice; the art consists in skilfully discriminating the circumstances which ought to modify general principles, whatever confirmation they may have derived from experience.”

The preceding observations of M. Esquirol have been confirmed, and in some particulars more strongly stated, by the late M. Georget. This intelligent writer has remarked that all physicians who have habitually the care of

lunatics, have recommended the seclusion of these invalids, in almost every case, as the first condition, and one of the first means in their treatment. "Lunatics," he says, "ought to be separated from the objects which have excited their disease, or which foster or aggravate it; from relatives or servants whom they dislike, whom they pretend to command, and to whom they will never submit; from busybodies, who only irritate them by useless arguments or misplaced ridicule: they ought to be separated from society, and placed in an appropriate habitation, to ensure both the safety of the public and their own preservation. Their friends are always repugnant to put this plan into execution: a mother, a wife, or a husband; can with difficulty believe that the object dearest in the world to either of them can be better placed in the hands of strangers than under the influence of those who are eager to devote the most affectionate cares; they fear likewise that in lunatic asylums the sight of the patients will have a bad effect upon their friend, and aggravate the disease; that constraint, severity, and all kinds of bad treatment will be employed to manage the patients, and, if once cured, they will preserve a horrible impression of their abode, and resentment against their relations who have consented to their confinement. These last considerations induce rich families to place their deranged relatives in private houses destined to receive a single lunatic, who is surrounded by servants and inspectors whom he does not know. Besides that these private establishments are very expensive, they rarely answer the end proposed; either some relation chooses to remain near the invalid, or the latter soon perceives that every thing by which he is surrounded is destined for his service; in either case the objects of seclusion are imperfectly attained. Lastly, many things are often required which are only to be found in public establishments. This imperfect separation, however, is all that can be adopted in some families, and we must make as much advantage of it as we can. In public asylums the seclusion is complete; the patients soon know that they are under the authority and even at the discretion of the director; they are watched and constrained without difficulty, under the care of regular attendants. They find powerful sources of occupation and of distraction in associating even with the other patients. The greater number of lunatics never discover that they are in the midst of mad people, and find nothing to complain of in this circumstance. When their reason begins to return, they are removed into the department destined for the reception of convalescents, and hence are withdrawn from sights which might make unpleasant impressions upon them. As long as the disease continues, they are angry with those who have deprived them of their liberty; but as soon as they have recovered their reason, resentment is changed into gratitude. On this account, then, the friends of the insane incur no risk. We do not pretend to deny that this separation and abode among other lunatics has

occasionally aggravated the disease, when of recent occurrence, in some individuals: on the other hand, we affirm that the same means have cured many lunatics almost immediately. Besides it is next to impossible to preserve and take care of maniacs or monomaniacs in the midst of their family, and all the inconveniences of separation disappear under the absolute necessity of its use."

The same writer has briefly summed up the principal circumstances to which attention ought to be paid in the construction or choice and in the management of an asylum or house of recovery for lunatics. He has collected these remarks from the writings of Pinel and Esquirol.

"1. M. Pinel has particularly insisted upon the necessity of classing lunatics, of separating such as are liable to injure themselves or others, and permitting those to associate together who may contribute to each other's cure. A lunatic asylum ought, then, to be composed of several parts more or less insulated. There should be a quarter appropriated for each sex, a division for violent lunatics, a second for those that are tranquil, a third for convalescents, a fourth for lunatics who labour under accidental disorders. It will be very useful to have a division for those who are of melancholy habits, and in a state of dementia, and another for furious and noisy patients, and for some lunatics who are of an untameable character, and are confined by way of punishment. It is above all things necessary to separate the sexes, the convalescents, and likewise those patients who have depraved habits and indecent manners. Each division ought to have a court planted with trees, and, if possible, a garden for the patients to walk in.

"2. M. Esquirol, who has devoted his attention to the arrangements which these establishments require for the convenience of the patients, to facilitate vigilant superintendence and attention, and to prevent accidents, is of opinion that such houses should be built on level ground; that the cells destined for violent patients should be spacious, with a door and window opposite each other, and opening from without; that they should be boarded and not paved, furnished with a bed, firmly fixed in the wall; that all the cells should communicate with covered galleries or corridors, in which the patients may walk in bad weather, and by means of which the inspectors and servants may easily traverse the different parts of the establishment; that all the rooms should be warmed by pipes of hot air; that abundance of water should be furnished by fountains to wash the dirty cells; that the privies should be separated in such a manner as to occasion no inconvenience to the patients; that there should be places appointed for a general work-room, for a common dining-room, for baths and shower-baths. In this plan of M. Esquirol's there are dormitories only for convalescents, melancholic patients, idiots, and individuals who are debilitated. For others little cells with one bed are preferable, in almost every case; during the day the patients can go out and

associate with others, and in the night they do not require companions.

"3. Beings deprived of reason, who fancy themselves reasonable, who incessantly desire and demand things that cannot be granted them, and who are nevertheless sensible to kind as well as to bad treatment, must needs be difficult to influence, to govern, and to cure. As long as each person continues insane, he looks upon the director and inspectors of the establishment as accomplices in the power which has deprived him of liberty, and upon the attendants as inhuman jailors. Even after his cure he is not always very grateful. The director, the inspectors, and the attendants, will invariably be objects of prejudice, suspicion, and hatred to the patients; they will receive abuse and often blows from them. On the other hand, it is impossible for one who has not had for a long time the care of them, and studied their disease, to know the mental disposition of lunatics. Without such preparation we should attribute to wickedness what is the effect of disease, or look upon lunatics as beings deprived of all sensibility. In either case we might be induced to treat them with severity. It is almost impossible to make servants understand that mad persons have the use of some of their faculties, with the exception of those servants who have been themselves attacked by the disease. At the Salpêtrière and the Bicêtre great advantage is derived from employing persons who have been cured to take care of the patients. The physician of a lunatic asylum ought to be particularly careful to instruct the individuals who are to have the management of the patients.

"4. It is absolutely necessary that a judicious arrangement of authority and subordination be established in lunatic asylums, and that the physician be invested with a power superior to all with regard to every thing that concerns the patients."

The chief points on which the moral cure of madness turns are thus summed up by M. Georget.

"We may refer to three principal heads all the regulations that can be put in practice with reference to the discipline and exercise of the mental powers in lunatics. 1. Never to excite the ideas and passions of the patients upon the subject of their delirium. 2. Never directly to oppose their unreasonable ideas and opinions, either by argument, discussion, opposition, contradiction, or ridicule. 3. To fix their attention upon subjects foreign to their hallucination, and communicate to their minds new ideas and affections by means of different impressions.

"According to the first principle, we should withdraw the patient from the causes which have excited his madness, and even from objects which might recal these causes, or suggest any allusion to them. Lunatics attacked with religious melancholy should be deprived of their books of devotion; they should not be permitted to engage in offices of religion. Those who are tormented with sexual desires render these desires more imperious by gratify-

ing them; if they do not destroy their health. We ought never to flatter the chimeras of kings, of princes, of gods, of queens. We should never put the patients attacked with the same kind of insanity together, because they would talk incessantly of their conceits, and thus cause to each other a great deal of injury. Thus, as in other diseases, we ought to leave the over-excited part at rest.

"According to the second rule, we should never attempt to reason with lunatics in order to bring them to their senses, for their errors are necessarily connected with their disease. The most evident proofs are of no weight upon the mind of a lunatic. He will suspect that there are secret reasons for deceiving him. Discussion, opposition, contradiction, irritates the disease, and inspires defiance and hatred. In accordance with the third rule, we should make it a point to occupy the mind, and to direct it by different means, such as exercise, work, play, the society of other patients, sane persons presiding over them; by music, reading, conversation, the visits of friends, &c. We should oppose one passion to the ruling passion, and on some occasions excite the activity of feeling by strong emotions, by means of fear, or the sudden announcement of bad news. But these different means are applicable neither in every case nor at every period of the disease. It is in general very difficult to turn for any length of time the attention of the patients from the subject of their delirium; it is above all things difficult to engage them in occupations either of work or amusement. Very often the disorder of their minds is such that they are continually under the influence of their delirium; they exist in their illusions, and their attention is hardly arrested by the objects that surround them. Restoration to their friends should never take place until the convalescence of patients is perfectly established, and even then great precautions must be used to manage the first interview, to prepare the mind of the patient and of the relatives, and to fix the subject and length of their conversation.

"An active and constant inspection exercised over the patients and the attendants is very necessary in a lunatic asylum. Patients who evince a disposition to suicide should never be lost sight of for a single instant, whatever they may say or do to obtain their wish. It is often necessary to confine violent patients with the strait waistcoat. Those who are addicted to indecent practices,—a circumstance by no means infrequent,—should be restrained by similar means. Occasionally it is better to confine them by shackles on the legs, fastened down in an arm-chair, or shut up in their rooms, according to circumstances. The use of chains is almost entirely abandoned, and we are indebted to the noble efforts of our venerable Pinel for this improvement in the lot of lunatics." (It may be observed that M. Foville ascribes to the Quakers who have managed the "Retreat" the credit of having been the first to discard these inhuman instruments of restraint.) "At the time of the abolition of chains at Bicêtre, M. Pinel observed that the diminution of the

number of furious lunatics, and the accidents which they occasioned, was very remarkable. The only measures of punishment that ought to be put into practice are the strait waistcoat, seclusion in a cell, removal from one division to another, the shower-bath, and some occasional privations. A violent or wicked lunatic, who all at once puts on a menacing appearance, or even commits reprehensible actions, should be immediately surrounded by a number of attendants, approached and seized at the same time on all sides, particularly by those who are behind him. Sometimes great advantage has been found by suddenly enveloping the patient's head in a napkin, which completely bewilders him. In other cases, while persons placed before the patient endeavour to occupy his attention, others advancing from behind easily lay hold of and secure him.

SECT. VII.—*Puerperal madness.*

This term is chiefly and most correctly applied to a form of insanity incident to puerperal women. By some writers the same expression has been so extended in its meaning as to comprise that species of derangement peculiar to females who are debilitated by suckling, and which commences in general several months after child-birth.

Symptoms of insanity occasionally display themselves during pregnancy, and under circumstances which indicate that they are dependent on that state. These cases are rare in comparison with those which occur after delivery. M. Esquirol mentions the instance of a young woman of very sensitive habit who had attacks of madness on two occasions, each of which lasted fifteen days, having commenced immediately after conception. The same writer observes also that several women at the Salpêtrière have become maniacal during the time of their pregnancy.

Cases of puerperal madness properly so termed, that is, coming on after child-birth, are by no means infrequent. M. Esquirol has related that among 600 maniacal women at the Salpêtrière, there were 52 cases of this description. In another report by the same writer, there were 92 similar cases among 1119 insane females admitted during four years into the above-mentioned hospital. M. Esquirol is of opinion that the proportion is still greater in the higher classes of society, since out of 144 instances of mental disorder occurring in females of opulent families, the symptoms had displayed themselves, in 21, either soon after child-birth or during the period of lactation. Dr. Haslam enumerates 84 instances of puerperal mania in 1644 cases admitted at Bethlem. Dr. Rush, however, reckons only five such cases in seventy received into the hospital for lunatics in Philadelphia.

There is no peculiarity in the phenomena of puerperal madness by which this disease is distinguished from other examples of insanity. Dr. Gooch has remarked that "if a physician was taken into the chamber of a patient whose mind had become deranged from lying-in or

nursing, he could not tell by the mere condition of the mind that the disease had originated in these causes."

Those cases which are more properly termed puerperal, as occurring in the first period after childbirth, are generally of the character of mania, attended with excitement of the feelings and mental illusions; while the disorder which displays itself in women exhausted by suckling is most commonly connected with melancholy depression, a tendency to which may generally be perceived in females who nurse their children too long with reference to the strength of their own constitutions. Cases of the former description occur within a short period, and most frequently within a fortnight after delivery. They appear sometimes to be occasioned by fright or other accidental causes of disturbance; sometimes by errors in diet, or by premature exertions or excitements: in other instances they take place independently of any discoverable external cause. The patient passes one or two restless nights, appears unusually excited and irritable, talks loudly and incessantly, and very soon betrays a disturbed intellect. The attack is often attended with febrile symptoms. This is the case especially, as Dr. Burrows has observed, if it takes place about the fourth or fifth day, when the secretion of milk is producing a new excitement. The state of the pulse is the most important symptom in reference to the nature and treatment of the case, as well as to the prognosis which is to be formed of its result. Dr. Gooch has laid particular stress on this circumstance, and he has extracted a valuable passage which bears upon it from the manuscript lectures of Dr. Hunter. "*Mania*," said this eminent practitioner, "is not an uncommon appearance in the course of the month, but of that species from which they generally recover. *When out of their senses, attended with fever, like paraphrenitis, they will in all probability die*; but when without fever it is not fatal, though it (i. e. fever) generally takes place before they get well. I have had several private patients, and have been called in when a great number of stimulating medicines and blisters have been administered, but they have gone on as at another time, talking nonsense, till the disease has gone off, and they have become sensible. It is a species of madness they generally recover from, but I know of nothing of any singular service in it."

Dr. Gooch's comment upon this passage is the remark, supported by his own observation, that there are two forms of puerperal mania: one of them is attended by fever, or rather by a rapid pulse; the other is accompanied by a very moderate disturbance of the circulation. Cases of the latter kind, which happily are by far the most numerous, terminate in recovery; the former are generally fatal.

Terminations of puerperal madness.—Puerperal madness terminates, in a great proportion of cases, either in death or in the recovery of reason. Few instances, comparatively, become cases of permanent insanity. It is, however,

very difficult to obtain accurate information on this subject. Dr. Gooch has observed that the records of hospitals contain chiefly accounts of cases which have been admitted because they had been unusually permanent, having already disappointed the hope, which is generally entertained and acted upon, of relief by private care: the cases of short duration, which last only a few days or weeks, and which form a large proportion, are totally overlooked or omitted in the inspection of hospital reports. This remark accounts for the unfavourable nature of the results which are obtained from such tables as those given by M. Esquirol and others. By this writer ninety-two cases are enumerated, of which fifty-five recovered, and six died, leaving thirty-one as the number of incurables, that is, one in three. Of the fifty-five recoveries, thirty-eight took place within the first six months. Dr. Haslam says that of eighty-five cases admitted at Bethlem, only fifty recovered, leaving thirty-five as the number of incurables. Dr. Burrows mentions fifty-seven cases, of which thirty-five recovered, and eleven remained uncured; of the recoveries, twenty-eight took place within the first six months. Dr. Gooch has remarked that these tables throw but little light upon the real proportions of recoveries, and present a prospect unnecessarily gloomy and discouraging. He adds, "Of the many patients about whom I have been consulted, I know only two who are now, after many years, disordered in mind, and of them one had already been so before her marriage."

The question, on the solution of which there is the greatest reason for anxiety in reference to any particular case of puerperal madness, is, whether it is likely to be fatal; because, if not fatal, there is great probability of ultimate recovery. The most satisfactory way of coming to a conclusion on this inquiry in any individual case, is by the prognostications which the particular symptoms afford, and on this subject we can add little to what has already been said. The principal danger which menaces life in cases of this description is a state of extreme debility; the excitement of the vascular as well as of the cerebral functions, is so great as to wear out the strength, already at a low ebb, and neither recruited by nutrition nor by sleep, and the patient sinks from exhaustion. Experience has proved that a rapid circulation is the principal circumstance which tends to bring on this state. A very frequent pulse is the most unfavourable symptom. Long-continued resistance to sleep, and a state of complete restlessness, and the appearance of great weakness and inanition, give likewise reason for apprehension. If these signs are not found, the mental derangement of the patient need not give occasion to very serious alarm.

Medical authors have sought to found a prognostic in puerperal madness on the estimate of the proportions which deaths bear to recoveries. This cannot afford evidence on which so much reliance may be placed as on the symptoms of individual cases. Out of the

ninety-two cases mentioned by M. Esquirol, of which fifty-five terminated in recovery, there were, as we have observed, six deaths, and in Dr. Burrows's table of fifty-seven cases there were ten deaths. The former calculation gives one death in fifteen cases, and the latter one in six. But the patients in the Salpêtrière are probably removed thither after the period in which the disease is most dangerous to life. There must have been some circumstance tending to explain the discrepancy in the above-mentioned results. The proportion of deaths given by M. Esquirol's table may be somewhat too low, but we are inclined to believe that the result afforded by that of Dr. Burrows gives a greater mortality than the average number afforded by general experience.

Pathology of puerperal madness.—The pathology of this disease involves several disputed questions, which we must not pass over without stating them, although we by no means expect to furnish a solution that shall be satisfactory to all parties.

The first inquiry is whether puerperal madness depends for its immediate or proximate cause on inflammation of the brain and its membranes.

The arguments urged in proof of this opinion, are, in the first place, the result of anatomical examination in cases of madness in general. We must refer to a former section of this treatise on the necroscopical researches into the state of the brain in the bodies of maniacal patients, for evidence on this subject, and for proofs of the general inference that inflammation, or a state closely allied to inflammation, is really the condition of the brain in cases of insanity. As puerperal madness is identified by its symptoms with other forms of insanity, this analogical argument has evidently some weight until it shall be proved that this particular form of mental derangement furnishes an exception to the general fact.

Secondly, the phenomena displayed by dissections in cases of puerperal madness itself, have been thought by some to afford evidence in favour of the same conclusion. Unfortunately there is some discrepancy in the results of anatomical researches in respect to such cases. We have no extensive record of accurately related dissections, which might illustrate on a large scale the pathology of this disease. M. Esquirol says that he has examined the bodies of several patients who have died under puerperal mania, without being able to detect any morbid traces that pointed out the seat of the disease; and Dr. Gooch has given the details of a case, at the termination of which he says, in general terms, that although the body was examined by a very eminent anatomist, no vestiges of disease were discovered in the brain or elsewhere. In several other cases, however, described by the same eminent writer, it must be observed, that although the complaint had occurred in bodies already exanguious from uterine hemorrhage and other exhausting causes, there were discovered on dissection thickenings of the dura and pia mater, sinuses

full of blood, serum effused under the arachnoid membrane, hardness of the brain, and numerous bloody points, on cutting the substance of the hemispheres. Dr. Burrows has likewise referred to several cases in which there were marks of cerebral congestion; and in particular to one of Newman's dissections, in which the arachnoid membrane was quite firm, and nearly as thick as the dura mater. On the whole there is sufficient evidence that in general the brain of puerperal maniacs displays, in a greater or less degree, the phenomena which are accounted to indicate the presence of inflammation.

The reasons which in the minds of some writers have over-weighed all the arguments furnished by these observations, are the following: first, that the disorder in question frequently attacks patients who are previously in a state of great exhaustion, and therefore thought unlikely to be assailed by complaints of an inflammatory nature; and secondly, that puerperal madness, as might be expected from the circumstances under which it takes its rise, and the exhausted and debilitated state of many patients who are attacked by it, cannot be safely treated by powerful antiphlogistic measures, such as copious bleeding. "Are we," says Dr. Gooch, "to shut our eyes to the symptoms during life, to the effect produced by remedies, to the mode in which death comes on,—that is, with symptoms of exhaustion, and to the remarkable emptiness of the veins throughout the body; and because there was a little serum under the tunica arachnoides, and more bloody points than usual in the medullary substance of the brain, conclude that it was a disease of congestion or inflammation, and that perhaps the patient died because she was not bled sufficiently?" This last part of the inference would, indeed, be much more than the premises would warrant; the question, what is, in a pathological point of view, the condition of the brain, becomes comparatively unimportant and almost a matter of mere curiosity, when the practical indications are already given, and even become the data from which we are to deduce reasons as to the nature of the disease. Yet it must be allowed that the existence of inflammation is not disproved by either of the arguments advanced. The disease supervenes on an exhausted state of the system, but so do many other inflammatory complaints. Pneumonic affections often attack women who have suffered much in childbirth from uterine hemorrhage, but we do not for this reason call into question the inflammatory nature of pneumonia. Neither are we authorized in asserting that the disorder is not inflammatory, by the fact that the patients labouring under it do not bear bleeding *ad libitum*. How many inflammatory complaints are there in which we cannot venture freely on the use of the lancet? Dr. Gooch's observation is, in a practical point of view, of the highest value. Antiphlogistic and evacuant remedies must not be used without the greatest caution in cases of puerperal mad-

ness; but the existence of inflammation in the brain and its membranes, when evidence of it is displayed in the characteristics of vascular fulness and other usual phenomena, is not disproved by this consideration.

The theory of this disease, in reference to the nature of its constitutional and proximate causes, may be different in cases which occur at different periods; and this is the more likely, because these cases vary in respect to their phenomena.

In those instances of maniacal affection which occur during pregnancy, it is probable that the disordered state of the brain or of the cerebral functions is the result of sympathetic excitement, which the vascular system, perhaps that of the brain in particular, sustains from the peculiar state of the uterine functions. The well-known complaints connected with temporary excitement of the brain in some females at the period of the catamenia, the symptoms thence resulting, such as the returns of hysterical, epileptic, cataleptic paroxysms, or of hysterical and sometimes maniacal excitement of the mind, are pathological facts sufficiently illustrative of the affection alluded to, and shew it to be in accordance with other morbid phenomena.

When madness comes on after childbirth, the pathology of the case is, perhaps, different from that of the affection now described. Dr. Gooch said, "the cause of puerperal mania is that peculiar state of the sexual system which occurs after delivery." He afterwards thought this account of the matter not sufficiently explicit. "What I meant was this; the sexual system in women is a set of organs which are in action only during half the natural life of the individual, and even during this half they are in action only at intervals. During these intervals of action they diffuse an unusual excitement throughout the nervous system,—witness the hysteric affections of puberty, the nervous susceptibility which occurs during every menstrual period, the nervous affections of breeding, and the nervous susceptibility of lying-in women. I do not mean that these appearances are to be observed in every instance of puberty, menstruation, pregnancy, and childbirth, but that they occur sufficiently often to shew that these states are liable to produce these conditions of the nervous system." He adds, "Dr. Marshall Hall thinks that the susceptibility of the puerperal state is to be explained by mere exhaustion, and does not at all depend on the influence of any thing specific in the condition of the several organs at that time; but would an equal or a greater degree of exhaustion at any time occasion the disease? This is a question of fact which I should answer in the negative. I have seen patients who have been deranged in childbed, and who had recovered, at a future period much more exhausted by illness, and much more agitated in mind, without the slightest appearance of mental derangement."

It would seem that we are here referred for an explanation of the maniacal affection which

occurs soon after childbirth, to excitement produced by the state of the uterine system. A remark, however, which obviously suggests itself on this subject is, that the phenomena of puerperal madness usually display themselves just at the period when uterine excitement is subsiding. If ever the uterine functions, or the activity of the whole system of organs connected with them, is suspended, it is during the time shortly following the puerperal period. We should not, at this conjuncture, expect the brain and the mind to be excited by sympathy with organic actions, which are in fact in a state of temporary cessation. But the expression, excitement of the sexual system, which is allowed to be too indefinite to convey a very precise meaning, may include the process of lactation. Perhaps it is to the irritation produced by the secretion of milk that we are more particularly to direct our attention; for this secretion is a part of the series of functions belonging to the sexual system. But here we only return to the popular notion, according to which the disorder depends on the flow of the milk. Such is the opinion of old women and nurses in general, and it may be the true one. The relations, however, of puerperal madness to the different processes which are set up or cease in the animal economy subsequently to childbirth, will be illustrated, if susceptible of illustration, by an exact observance of the periods at which this affection most frequently displays itself. The information obtained on this subject is not so complete as we might desire, but still it is of some value.

Sauvages and other writers have recognized two different forms of mental derangement incident to lying-in women. One of them has been termed "*paraphrosyne puerperarum*," and is observed to succeed labour, immediately or within a day or two, before the secretion of milk can disturb the system, and independently of any lochial suppression. "These attacks," says Dr. Burrows, who assents to the above distinction of varieties in the disease, "will sometimes go off under the operation of a smart purge and an opiate, and may then be considered as merely accessions of delirium; in other instances they are more permanent, and become fully developed instances of puerperal insanity. Sauvages' second species is termed '*mania lactea*;' and Dr. Burrows is of opinion that maniacal symptoms in reality make their appearance most frequently about the third or fourth day after childbirth, which countenances the notion that they are connected with the lacteal secretion. This writer, however, has very candidly referred to the evidence deducible from the tables published by M. Esquirol, although it is rather opposed to the opinion above stated. From these tables it appears that in the years 1811, 1812, 1813, 1814, eleven hundred and nineteen insane women were admitted into the Salpêtrière, of whom ninety-two laboured under puerperal madness: of these—

16 became delirious from the first to the fourth day.

21 from the fifth to the fifteenth day, which generally includes the termination of the lochia.
17 from the sixteenth to the sixtieth day.
19 from the sixtieth to the twelfth month of lactation.

19 after forced or voluntary weaning.

The result seems to be, as Dr. Burrows allows, that the disease is more frequently a consequence of delivery than of suckling.

On the whole it appears evident that some cause more general in its influence than any one particular process must be referred to, if we would explain the frequent occurrence of madness in pregnant, puerperal, and suckling females.

A view of this subject which seems to us more illustrative of it, occurred to Dr. Ferriar, and has been thus stated by him.

"I am inclined to consider the puerperal mania as a case of conversion. During gestation, and after delivery, when the milk begins to flow, the balance of the circulation is so greatly disturbed as to be liable to much disorder from the application of any exciting cause. If, therefore, cold affecting the head, violent noises, want of sleep, or uneasy thoughts, distress a puerperal patient before the determination of blood to the breasts is regularly made, the impetus may be readily converted to the head, and produce either hysteria or insanity, according to its force and the nature of the occasional cause."

That new determinations in the vascular system should ensue on the removal of one so long subsisting as that to the uterus during pregnancy, is in accordance with a well ascertained principle in pathology. The natural and healthy determination under these circumstances is to the lacteal glands, but owing to various causes, either external or of predisposition, morbid determinations occasionally take place. Some women become phthisical at a very early period after childbirth, or rather the symptoms of phthisis develop themselves at that time in a manifest form. Other constitutional complaints are apt to arise at the same period, according to the prevalent tendency of the habit. When the brain is susceptible, it is likely to suffer in its turn, and become the seat of local disorder, the manifestations of which are affections of the mind. If we consider the frequent changes or disturbances occurring in the balance of the circulation from the varying and quickly succeeding processes which are carried on in the system during and soon after the periods of pregnancy and childbirth, we shall be at no loss to discover circumstances under which a susceptible constitution is likely to suffer. The conversions or successive changes in the temporary local determinations of blood which the constitution under such circumstances sustains and requires, appear sufficiently to account for the morbid susceptibility of the brain.

The cases of mental disorder which occur in the later periods of lactation are, as it is evident from M. Esquirol's table, of two kinds. In one the disease supervenes on

weaning, and probably has its origin in the subsidence of the lacteal secretion. There are other instances which appear to arise from the continued excitement and exhaustion of the system consequent on suckling. This state of exhaustion takes place at different periods in different constitutions. Some women can continue to give milk without injury for years, but by others, morbid feelings are experienced in the space of a few months or even of as many weeks, and do not subside for some time after weaning. The writer of this article has observed very numerous instances of melancholy dejection with symptoms of insanity more or less strongly marked, which have displayed themselves in the protracted period of nursing, and in females who were evidently suffering from exhaustion. In one instance a lady, who on former occasions had complained of feelings termed nervous, and had been much indisposed when giving milk, was persuaded to continue suckling a child until the thirteenth or fourteenth month. She was then attacked by a maniacal disorder, which, though of a mild character, was very decided in its nature. Nearly a year passed before her mind was perfectly restored.

Treatment of puerperal madness.—If we consider that the greatest danger to be apprehended for patients labouring under puerperal madness arises from a state of extreme exhaustion, that many women die from this cause within a short interval from the commencement of the disease, and that if they survive this period, the healthy state of the mind is in most instances restored, it will be evident that our chief endeavours must be directed to the present support of life. If we can maintain and restore the general health, and keep the natural functions in a state compatible with continued existence for a time, the disease of the animal system will in all probability subside. Antiphlogistic and particularly evacuant remedies must be used very sparingly and with great caution.

1. Bloodletting, as a general remedy for puerperal madness, is condemned by all practical writers on whose judgement much reliance ought to be placed. M. Esquirol is decidedly opposed to it. Dr. Gooch's observations on this subject contain the best exposition of the rules which ought to guide medical practitioners as to the use of the lancet in cases of puerperal madness. He says, "The result of my experience is, that in puerperal mania and melancholia, and also in those cases which more resemble delirium tremens, bloodletting is not only seldom or never necessary, but generally almost always pernicious. I do not say that cases never occur which require this remedy; no man's experience extends to all the possibilities of disease, but I have never met with such cases, and I would lay down this rule for the employment of bloodletting—never to use it as a remedy for disorder in the mind, unless that disorder is accompanied by symptoms of congestion or inflammation of the brain, such as would lead to its employment though the mind was not disordered. Even

here, however, great caution is necessary; local is safer than general bleeding. In one case the head was hot, and the face red, and the pulse was said to have become somewhat hard, yet a bleeding of eight ounces was followed by extinction of the pulse within three hours, and death in less than six. The only cases attended by a quick pulse which I have seen recover were those in which no blood was taken. In the really inflammatory diseases of the brain, bloodletting of course is essentially necessary, but these, I think, can never be mistaken for puerperal insanity; they are febrile headaches, more or less acute. Pain of the head with fever is a much better indication for bloodletting than disorder of the mind without these symptoms."

2. In cases attended with much heat about the scalp, flushing of the face, and strong pulsation of the temporal and carotid arteries, it will be proper to shave the head and keep it cool by means of cold lotions, or an oil-skin cap filled with ice or iced water, or by evaporating lotions. If the symptoms above mentioned and those of mental excitement are very acute, and the debility of the patient is not in an alarming degree, a few leeches may be applied with advantage. Blisters to the occiput or nape of the neck are often serviceable; they are much recommended by practical writers. When the scalp is not hot, and the tendency of the disease is rather to stupor than to a high degree of excitement, blisters are usefully applied over the top of the head.

The lower extremities, which are often cold, should be frequently immersed in hot water, or a hip-bath used. Dr. Burrows recommends bathing the legs and feet in a warm infusion of mustard or horse-radish. Heat should be applied in the most convenient form, and the circulation in the extremities promoted by other obvious means.

3. Purgatives and emetics are among the most useful remedies in this disease. The alimentary canal is frequently in a disordered state, the tongue furred, the breath fetid, the skin discoloured, the evacuations dark and offensive. A few brisk purgative doses, calomel followed by castor-oil or rhubarb and magnesia, should be given in such cases. Emetics of ipecacuanha, with small doses of tartarized antimony, are very valuable remedies in this state of the alimentary canal. Dr. Gooch has remarked that they should be used with caution when the face is pale, the skin cold, and the pulse quick and weak; and in general he prefers ipecacuanha to antimonials.

4. After these evacuant remedies have been premised, great advantage is frequently derived from the use of opiates. Full doses are generally attended with the best success. Ten grains of Dover's powders may be given at night, or a grain and a half of solid opium, or thirty drops of the tincture. Several writers recommend Battley's solution of opium in preference to the tincture; perhaps the acetate and muriate of morphia are the best preparations of opium; they may be given in doses of a quarter or half of a grain, and repeated

every third or fourth hour until sleep is procured. When opiates disagree, Dr. Gooch recommends the use of hyoscyamus, mixed with camphor. He says that five grains of each should be given every sixth hour, and a double dose at night: a dram of the tincture will answer the same purpose. This writer is of opinion that narcotics are the most valuable remedy in the cure of puerperal mania; he says "that they often produce nights of better sleep and days of greater tranquillity, and this calmness is followed by some clearing up of the disorder of the mind." He says that these remedies produce salutary effects much more frequently in the mania of lying-in women than in maniacal disorders occurring under other circumstances; if, however, there is heat in the head, flushing in the face, and thirst, their use ought to be postponed until such symptoms shall have been removed.

5. In the more protracted cases of puerperal madness, tonic and stimulant medicines are sometimes requisite, especially when the appetite has failed. Ammonia is much recommended. It may be given with infusion of cinchona or any bitter infusion. When it is not offensive to the stomach, the rectified oil of turpentine is one of the best stimulants, especially if taken in the dose of a dram three times in a day with cinnamon water, or any other aromatic fluid.

6. A rule of great importance refers to the diet of women in puerperal madness. It may, perhaps, be safely asserted that the greatest risk which patients in this disease incur is that of being starved through the mistaken notions of their attendants, who are too often disposed to consider the excitement of maniacal disease a reason for withholding food, when this very state, owing to the exhaustion produced by its long continuance, renders it especially necessary to support the strength more carefully. Farinaceous fluids of a nutritive quality, milk, rice, and other such matters should be given at short intervals, when febrile symptoms preclude the use of animal food. In most instances broth may be allowed and ought to be given. In the more protracted periods solid meat, with malt liquors, should be taken. We have seen very many maniacal patients labouring under great weakness and exhaustion, with cold extremities, a clammy skin, passing sleepless nights, and under continual agitation, begin to improve as soon as their diet was changed, and meat with some ale or porter given daily. The pulse has become fuller and less frequent, the extremities warm, sleep has been restored, and convalescence has taken place in a surprisingly short period after such a system has been adopted.

7. The last observation to be made refers to the management of such patients. We must here advert to the remarks to be found in a former section on the management and moral treatment of maniacal patients in general. The general rules only require modification in some particulars in relation to the peculiar circumstances of puerperal patients. The latter for obvious reasons cannot be soon removed from

home. They require in other respects similar management. They should be separated from relatives and friends, and carefully attended by persons who are fitted for the occupation by habit. It will not so often be necessary to send puerperal maniacs to lunatic asylums as deranged persons of a different description.

SECT. VIII.—*Senile dementia.*

Senile dementia is essentially distinct from insanity; yet for various reasons that will be apparent, a short account of its phenomena will be properly introduced in this place.

We have already described that species of fatuity which is the frequent result of protracted insanity. The term dementia has been adopted by late writers to designate this morbid state of the mental faculties. This expression, however, has been used in a somewhat more extensive sense, as equivalent to fatuity in general, and as denoting, besides the ordinary sequel of madness, various other morbid conditions, in which the intellectual powers are impaired or obliterated. It is applied to the fatuity which occasionally follows apoplexy, epilepsy, palsy, and other comatose diseases. By many French authors the same term has also been made to comprehend the mental disease or decay peculiar to old age. In its last stage fatuity displays nearly the same phenomena in every case, by whatever causes induced or by whatever previous diseases it may have been ushered in; but in the early periods, to which, for reasons already explained, we purpose to limit the application of the term dementia, there are many shades of difference between its different forms. The intellectual weakness which follows apoplexy is not precisely of the same character as that demented state which is the sequel of insanity, and which occasionally gives way either to a renewal of maniacal excitement or to returning reason; nor is either of these affections precisely analogous to the decay of mind incident to old age. We must, in compliance with custom, continue to use the received term, but we shall distinguish the last-mentioned affection by the additional epithet of *senile dementia*.

The following is the description of dementia in general which has been given by M. Esquirol. "Dementia deprives men of the faculty of adequately perceiving objects, of seeing their relations, of comparing them, of preserving a complete recollection of them; whence results the impossibility of reasoning correctly. Demented persons are incapable of reasoning, because external objects make too feeble an impression upon them; because the organs of transmission have lost a part of their energy; or, lastly, because the brain itself has no longer sufficient strength to receive and retain the impression which is transmitted to it; hence it necessarily results that the sensations are feeble, obscure, incomplete: being unable to form a true and just idea of objects, these persons cannot compare them, or exercise abstraction or association of ideas; they are not capable of a sufficiently strong attention; the organ of thought has not energy enough: it has

been deprived of that vigour which is necessary for the integrity of its functions. Hence the most incongruous ideas succeed each other; independent of each other, they follow without order and connection; patients repeat words and entire sentences without attaching to them any precise meaning; they talk, without being conscious of what they say. It seems as if unreal expressions were heard by them in their heads, which they repeat in obedience to some involuntary or automatic impulse, the result of previous habits or of fortuitous association with objects which strike their senses."

Senile dementia differs in many particulars from the state of disease just described, though in some others resembling it. There is in both cases the same speedy and almost momentary obliteration of recent impressions, if the merely passive recognition of objects which present themselves to the senses may be so called. But in the disease peculiar to old age it may often be observed that ideas which were long ago stamped upon the mind remain with nearly their original force, and are capable of being called up whenever association suggests them, or the attention is purposely directed to them. The impressions produced by present objects are often so slight and evanescent, and the notions connected with them are so confused and indistinct, that the individual affected scarcely knows where he is; yet he recognizes without difficulty persons with whom he has long been acquainted, and if questioned respecting his former life and the transactions and pursuits of his youth or manhood, he will often give pertinent and sensible replies. The disorder of his mind consists not in defective memory of the past, but in the incapacity for attention and for receiving the influence of present external agencies, which, in a different state of the cerebral organization, would have produced an effect upon the sensorium, or seat of sensation and perception.

The following account briefly describes the state of a person labouring under senile dementia, who has been occasionally under the care of the writer of this article. It will serve to exemplify some of the foregoing remarks.

A. M——, aged about seventy years, was in his youth a farmer, but changed that occupation for the business of a baker, which he followed until he had accumulated property sufficient for his maintenance. He has been living for several years in retirement, and without any regular occupation. His memory is said to have undergone a gradual decay. When he is questioned respecting present objects and circumstances, he generally gives clear and distinct answers, but can seldom recollect what has occurred but a short time previously. In half an hour after he has been visited by his medical attendant, who is an intimate acquaintance, he will say, if asked, that he has not seen him for several days. His recollection of persons whom he knew in the former periods of his life, and of events which then happened to him, is tolerably clear, but at times, and especially after sleep, he does not know where he

now is. He sometimes fancies, at night, on waking from a short sleep, that he is engaged in his former occupations. He has risen from bed, and set himself busily to prepare for lighting a fire in his oven, beats the wall, calls his men up, and asks if the faggots are ready. He cannot be persuaded without great difficulty that he is in ——— street, and has nothing to do with the baking business. At other times he will get up in great haste to go down and see somebody who is waiting for him on business, or thinks that there is a horse standing for him at the door, calls for his clothes, and wonders that his friends are so tardy in assisting him. At these periods his state is not that of ordinary somnambulism. He sees and knows some at least of the persons who are about him, and will converse with them. He sometimes, during the day-time, wonders where he is, does not know the place though he has resided in the same house for some years. The hostess, who is an old acquaintance, at length convinces him that he is at her home. When his recollection is roused, and his thoughts are drawn into the right channel, he has a correct knowledge of persons, and shews not the slightest trace of maniacal illusions, or of anything approaching to the character of insanity. He is glad to see his old friends, shakes hands with them in his wonted cordial manner, is on the best terms with his relatives, and never displays the least deviation from the natural and habitual state of his feelings and affections.

Senile dementia, or the decay of the mental faculties, is not the lot of old persons universally, though it is a condition to which old age may be said to have tendency, and to which in the last stage of bodily decay some approximations are generally to be perceived. The change which time alone will perhaps sooner or later bring on, in those who long survive the allotted duration of man's days, may be accelerated by a variety of circumstances. Among these is a life of too much activity and excitement, of mental exertion beyond what the constitutional strength of the individual is capable of supporting without constant effort; excessive anxiety and eagerness in the pursuit of business, or intense and unremitted application to studies of whatever kind. The minds and bodies of men are only fitted for exertion in certain degrees, which, however, differ in different individuals; but the powers of all are limited. All have need of occasional respite from labour, and the appointment of rest during one day in seven is, from physical considerations alone, calculated to promote the well-being of individuals and of society. We may observe that among those who neglect this ordinance, there have been many who have suffered the penalty in this life. Some have terminated a rapid and perhaps brilliant career of unremitting and successful exertions by suicidal madness, of which too many and too well-known examples might be cited; others, though in a longer measure of time, have accelerated the period of intellectual decay.

A second cause of senile dementia, next in the frequency of its operation to that which we have

just mentioned, is the too liberal use of vinous or other fermented liquors. There are many persons who lead active lives, who are not considered intemperate, yet drink on an average nearly a bottle of wine in a day. Such persons, if their lives are not shortened, have every reason to expect a premature imbecility. The same affection has been observed frequently to make its appearance in men long engaged in active pursuits, soon after they have relinquished their business or professions, and have laid themselves by to enjoy ease and leisure for the remainder of their days. The disease often appears in a more marked and sudden manner in elderly persons who have sustained a slight attack of apoplexy or paralysis, which has perhaps been speedily recovered, and expected to have left but slight traces of disease. That expectation is verified so far as the sensitive and motive powers are concerned, but the seat of intellect is found to have been shaken in its very centre.

Senile dementia is entirely distinct from that species of moral insanity which appears occasionally, as we have already observed, in aged persons. The former is merely a loss of energy in some of the intellectual operations. It brings with it nothing morbid or unusual in the state of the feelings or affections, no tendency to depraved or unaccustomed habits; nor, commonly, any change in the temper and general disposition of mind. Individuals to whose lot this complaint has fallen are seldom unhappy on account of it, and if they are in any degree aware of their condition, they bear it with patience and cheerfulness. The state of the affections remaining natural and unperverted, is indeed a general diagnostic between disorders consisting merely of impaired faculties, and the forms of madness. The reverse of the previous remark applies, as we have said in the former part of this treatise, to the various modifications of insanity, and probably in greater or less degree to every case which can with perfect propriety be designated by that term.

This last observation, in its reference to senile dementia, may suggest a hint as to the justice and propriety of certain proceedings which are occasionally attempted and put in force with persons labouring under that affliction. As madness not only disorders the intellect, but likewise perverts the moral habits and the natural feelings of the afflicted individuals who are victims to it, there arises hence an obvious and unquestionable propriety in putting them under restraint. They are then not only placed under circumstances more favourable and sometimes essential to the cure of their complaint, but are likewise prevented from committing acts dangerous to themselves and others, and such as the same individuals would perhaps have shuddered to reflect upon in the days of sane and unclouded reason. To act otherwise with them would indeed be the height of cruelty. But the case is widely different when the moral disposition and the entire mental character remain unimpaired, and the memory only fails, or the aptitude to intel-

lectual exertion alone is diminished through the weakness of years. If an old man, who has spent the greatest portion of his life in active exertion, and has accumulated property by habits of labour and parsimony, after some time passed in retirement, begins to lose his recollection of passing events; if his faculties become impaired to a certain degree on account of that wealth which it has been the object of his life to accumulate, and for the amassing of which he has sacrificed all thoughts of ease and comfort during many successive years, he may now become the object of attack to some relative who may procure declarations of his incompetency to manage his estate. If such a person is brought before a jury and sharply interrogated, examined in figures, and puzzled by a variety of questions respecting matters of business, and other topics requiring accuracy in dates and calculations, it is not impossible that the affair may issue in his confinement in a lunatic asylum, or that at all events the management of his person and his affairs may be taken from the care of those to whom in the sound and entire state of his faculties he had confided both, and to whom, his moral affections and social feelings remaining yet unchanged, he still continues to be devotedly attached.

In France it has been for many years not unusual to confine aged persons of impaired faculties in the public *hospices* where deranged persons are admitted; and this practice has so much prevailed, that M. Georget alludes to it as a source of error and embarrassment in the attempt to determine the relative frequency of madness in late and in former times; these asylums being partly occupied by a number of old persons who remain till their decease, and whose disorders are not properly cases of insanity. Previously to the year 1790, out of 411 persons admitted as labouring under disordered or decayed intellect, there were only 19 whose age exceeded fifty years, whereas, in 2451 admitted between 1814 and 1821, not less than 880, or the third part of the entire number, were persons who had passed the period of life above mentioned. Of these, a great proportion were probably cases of senile decay. If the custom of thus getting rid of aged parents were a matter of choice and in general practice, without excuse on the ground of necessity, we might doubt whether our enlightened neighbours displayed their filial piety in a more advantageous manner than the *Battas*, who knock their aged relatives on the head and eat them, or than the old Irish, who, as Strabo assures us, *καλὸν τι ἡγοῦντο κατεσθίειν τοῖς πατέρας τελευτήσαντας*. But it is only among poor families that the custom prevails, and it is but parallel to the habit of the poor in England, who not unfrequently suffer their parents to die in parish workhouses. It is the greatest evil attendant on iron-handed necessity, that it so often breaks asunder the first and nearest bonds of duty and natural affection.

The following table will serve to illustrate the forms of disease which are included by medical writers under the common term of

dementia. It is styled by M. Esquirol, from whom we extract it, a table of causes. The table exhibits the distribution of 235 cases of dementia; the first column contains the number of patients admitted at the Salpêtrière during the years 1811 and 1812; the second column is the report of the author's private establishment, and is limited to persons of the higher or more opulent classes of society.

Table of causes.

	No. of individuals.	Total.
<i>Physical causes.</i>		
Disorders connected with the } catamenia	11	4
Critical period.	29	6
Consequences of childbirth.	5	3
Blows upon the head	3	0
Progress of age.	46	3
Ataxic fever.	1	2
Suppression of hemorrhoids.	0	2
Mania.	14	4
Melancholia	13	2
Paralysis	3	2
Apoplexy.	3	2
Syphilis and abuse of mercury	6	8
Faults of regimen.	0	6
Intemperance	9	6
Masturbation	4	7
<i>Moral causes.</i>		
Disappointed love.	1	4
Fright	4	3
Political excitement.	0	8
Disappointed ambition.	0	3
Poverty	5	0
Domestic griefs.	8	4
	192	73
		25

It may be remarked in reference to the first column, that the cases placed under the heads, 1, 2, 3, 8, 9, 12, 13, 14, 16, 18, 19, 20, 21, amounting altogether to 102, were probably instances of insanity in some of its forms, or of the stages of fatuity which are its consequences. There only remain 60 cases which, appear to have been instances of dementia not preceded by madness. Of this remainder, 46 cases are examples of senile decay, and these appear to form the great majority of cases, which are referred by the writer above cited to the head of idiopathic dementia, or dementia, unconnected with insanity. It therefore appears that this class of diseases nearly resolves itself into the sequelæ of madness, and the decay peculiar to old age.

It is obvious that the art of medicine in reference to senile dementia must be limited as to its sphere, in a great measure to the means of prevention, as cure is scarcely to be hoped. The prevention of this melancholy termination must, however, depend upon the habits of the individual, and on the mode in which the previous years of life may have been passed. In the regulation of previous habits may be found resources adequate in general to averting the approach of mental decay. Much will depend upon the manner of living during the early

period of old age, or when the physical powers are beginning to decline. Habits of indolence, and those of too great mental exertion, should be alike avoided; since many are observed to lose the vigour of their minds after a sudden and total retirement from active business, while in others the disordered state seems to have been brought on by too close application to studies, and particularly to those which require a sedentary life. The former of the causes above mentioned is, however, by far the most powerful and frequent in its operation, and numberless instances may be cited of persons who have exercised professions requiring considerable labour of mind during advanced years, without experiencing in consequence any decay of faculties.

The preservation of health in old age, both in other respects and in what regards the functions of the brain, will depend, in a very considerable degree, upon the adaptation of diet and regimen to the constitutional state of elderly persons. With the alteration of habits which advancing age implies, with the various changes in the state of the physical functions which it brings with it, a corresponding variation in diet and regimen is necessary, and if this is not made, disorder ensues. Many of the diseases incident to elderly persons are diseases of plethora, as apoplexies, and paralysis, and vertigo, and these are not unfrequently the preludes of dementia. The decay of faculties is observed to occur without such preludes in persons who live too freely. These and other considerations render it probable that the disorder of the brain connected with senile dementia depends upon a state of vascular repletion. When the disorders of old age have commenced, by a comparatively spare diet, consisting principally or entirely of farinaceous and other light vegetable food, by discontinuing in a great measure the use of wine and fermented liquors, the general health, and that of the brain in particular, will be greatly promoted. If there are decided threatenings of cerebral disease, an issue or seton, and the frequent use of mild aperient medicines to maintain a copious alvine discharge, will contribute to the same end, and will not only ward off attacks of apoplexy and palsy, but likewise lessen the tendency to senile dementia.

(J. C. Prichard.)

INTERMITTENT FEVER.—See FEVER.

IRRITATION.—It is remarkable that a term so commonly employed and so indispensable as this, should never have received a definite and generally acknowledged application. The agents and subjects, the causes and effects, the influences and phenomena of disease, have all indiscriminately passed under the name *irritation*, until the word has ceased to designate anything, and, “*vox et præterea nihil*,” is prostituted to pass off any obscure and unintelligible matter of pathology, for which more definite terms will give no quarter. If a case presents itself with bold and positive

features, such as pain, convulsion, delirium, palpitation, jarring pulse, and highly disordered function, but without certain characteristics of inflammation, it is distinguished by some as irritation; whilst others use irritation and inflammation almost as synonymous terms. If a person faints or dies under a surgical operation, or from a crushed limb, without hemorrhage, the result is ascribed to irritation: in another example, after the same accident, or the same operation, fever arises, and the patient dies in raving delirium; yet this is also termed *irritation*.

We do not venture to impugn the high authorities that have rendered the term conventionally applicable to such varied and opposite affections; but we would warn the student not to be misled, in his reading, by the etymology of the word; nor to suppose that in the extended application which it has received from various writers, irritation means anything more restricted than a class of morbid states of very considerable variety.

In further illustration of these remarks, and as an introduction to this subject, we shall extract some account of the views of *irritation* from the works of two distinguished writers, M. Broussais and Mr. Travers.

M. Broussais ("Examen des Doctrines Médicales," and "Histoire des Phlegmasies Chroniques,") bases his description of irritation on the particular physiological views which he entertains respecting the vital properties of animal structure. These properties he calls sensibility and contractility; they are possessed in various degrees by the different tissues, and may be locally increased by certain circumstances; such local exaltation always causing a diminution or depression of vitality in some other organ or system. This exaltation of vitality is accompanied by an excessive afflux or congestion of fluids to the part, and constitutes what M. Broussais throughout his writings designates as *irritation*. The causes or circumstances which produce irritation are of four kinds:—1. Excessive excitement by certain agents, called stimulants or irritants, directly applied; 2. sympathy with another irritated organ; 3. the absence of a stimulus which is habitual to the part; 4. repulsion of excitability from other part or parts.

One of the most remarkable features of this doctrine is, that irritation, when once formed in any part of the system, becomes a cause of irritation in other parts or systems; the influence being propagated by sympathy through the medium of the nerves. The phenomena of irritation vary according to the part which it affects, but the afflux of fluids, or active congestion, is common to all primary irritations, and this is prejudicial to the functions and regular nutrition of the part. The first seat of irritation is acknowledged to be in the nervous fibrils of the irritated part; and even in this stage irritation may be so intense as by means of the sympathetic effects on the system to cause death. But M. Broussais looks to the effects on the vascular system as the most important; and if he does not in his pathology

describe irritation as vascular universally, his therapeutics certainly imply this; accordingly the terms irritation and inflammation are used indiscriminately throughout his works. The irritation may be confined to the white vessels only, and then he designates it a *sub-inflammation*; but this, as well as what is generally understood by inflammation, is included under the general term irritation.

The increase of sensibility and contractility implied in irritation is sometimes shewn by pain, convulsion, &c., but it is not always directly manifest, and is frequently not so, when irritation has its seat in the viscera, where a system of nerves exists which do not transmit sensations to the sensorium. Frequently the sympathetic irritations are more manifest than the original one that excited them. These secondary irritations or sympathies are of two kinds, organic, and those of relation. The organic consist in organic phenomena, such as increased action, congestion, disordered secretion, nutrition, temperature, &c. Morbid sympathies of relation are shown by pain, convulsions of the voluntary muscles, and mental derangements. Any of these kinds of sympathy may be excited separately, but they more commonly co-exist; and in proportion to their intensity and number will be the severity of the disease; these generally depend on the sensibility of the organ primarily irritated, and of the system generally. Sometimes the original irritation continues to be predominant; the organ which it affects being the only one to suffer from congestion and disorganization; but occasionally it happens that a secondary irritation becomes the principal; this constitutes *metastasis*. Again, the principal irritation may be transferred to some organ of secretion or exhalation, and is relieved by a discharge from the system; this is what is called a *crisis*. When irritation causes an accumulation of blood in a tissue, so as to produce swelling, redness, and heat, it is called inflammation, this being only an irritation of an intense kind, observing the same laws as irritations in general, except that when unrestrained it proceeds more speedily to disorganization. These appear to be the main features of M. Broussais' doctrine of irritation in general. In describing its further application to particular diseases, he generally uses the terms irritation and inflammation as synonymous, and ascribes to such an affection variously multiplied by sympathy and reaction, and occupying various seats, all febrile diseases, hemorrhages, profluvia, morbid growths, most of the nervous diseases, dropsies, and even occasionally scurvy itself. In all febrile diseases and considerable inflammations the heart is sympathetically irritated, whence the quick pulse and hurried circulation; but the main and most important seats of irritation, either primary or sympathetic, are the mucous membrane of the stomach and bowels, and the brain. In all fevers called idiopathic, these irritations are the primary evils: they are equally so in the exanthematous and some other diseases; and there is not an inflammation of an extent

sufficient to quicken the pulse which does not sympathetically produce a decided irritation of these organs. The cerebral irritation is in most instances secondary to that in the stomach and bowels, and it always reacts on and increases the latter.

Without proceeding further in the details of this doctrine, which Coutanceau has well named the doctrine of irritation, we may sum it up by saying that there is not a disease to which the human body is liable which is not dependent more or less directly on irritation. Such an excessive generalization, it might be expected, would have been confined to the name only, and although it should give a new aspect to pathology, it could hardly be anticipated that a corresponding innovation would have been extended to therapeutics. But the case is far otherwise. Broussais, in ascribing all diseases to irritation, and in viewing in that irritation nothing but a grade of inflammation, recognizes truly curative means only in antiphlogistics, and denounces all other descriptions of remedy as irrational and hazardous. Nor is he less exclusive in his catalogue of antiphlogistic remedies: purgatives and emetics he prohibits as dangerous *irritants* of the gastro-enteric mucous membrane, that soul and focus of all sympathies: diuretics *irritate* the kidneys; expectorants the bronchial membrane; diaphoretics the skin; and instead of counteracting the original disease, they may reflect on it a new and aggravating irritation: the same objection applies in most instances to blisters and epispastics in general. In short, the whole class of antiphlogistic measures is, with trifling qualification, reduced to bloodletting, abstinence, and dilution.

Whatever may have been the triumphant proofs of success appealed to by the sanguine advocates of this doctrine, we refer to the united experience of the enlightened practitioners of this country, we refer to the records of these pages, for abundant evidence that its absolute practical application would be dangerous and unnatural, and that to deprive medicine of the agents that it so sweepingly proscribes, would be to curtail the art of its most salutary aids. Nothing can more strikingly expose the danger of excessive generalization than a familiar and unbiassed study of nature in all the varieties of her powers; and in our opinion the philosopher who would ascribe all natural phenomena solely to gravitation or some such general power, would not be more partial and incomprehensive in his views than the physician who attempts to restrict the still more complicated and diversified derangement of the animal body to an acknowledged but ill defined principle, and to still further limit the practice of his art by a partial view of that principle itself.

Great credit is due to M. Broussais for having fully established the fact, hitherto but little noticed, that local inflammations, particularly in the stomach and bowels, are present in most febrile diseases; that such inflammations are capable of producing great disorder and even inflammation in remote organs, by sympathy through the medium of the nerves;

and that similar affections frequently complicate themselves with and aggravate many chronic diseases. The most salutary results have been obtained from the application of this knowledge to practice, in the judicious use of adequate antiphlogistic measures wherever these inflammations subsisted; and a more qualified and cautious prescription of purgatives and other medicines in similar cases is another good flowing from the same source. But to make the word *irritation* the representative of the origin of almost every disease; to exclude from pathology all views of general morbid states, whether of plethora or inanition, excitement or depression; to refuse to acknowledge in local diseases any diversity of *mode* of action, referring all morbid phenomena and products only to excess or diminution; to exclude from therapeutics the whole class of alternatives, and to exaggerate in numerous kinds of evacuates their stimulant (often unproved) above their evacuant or antiphlogistic effects; to disregard the operation of narcotics, antispasmodics, and other medicines which exert a direct influence on the nervous system, and through it often favourably affect the vessels;—this is to deny ourselves the advantages of daily experience and unbiassed observation, and to render us the slaves of a system instead of the followers of nature.

If M. Broussais were a little more impartial and considerate towards his own principles, and would take more into view that state of the *nervous system* which he acknowledges to be primary in the state of irritation, and which, as existing alone, may properly be viewed as an object of distinct and specific treatment; if he would admit that a certain state of the vascular system is required before the irritation can produce inflammation, and that, therefore, antiphlogistics are indicated only when this state is present; and if he would take into consideration the secretent and exhalent power as well as the inflammability of the vascular system, and recognize the salutary operation of certain alternative, evacuant, and astringent medicines; then his physiological system would stand on a broad and comprehensive basis, and its application to practice would be consistent both with principle and with the general experience of the most successful practitioners. But in its present state we cannot but view this doctrine as partial and exclusive; and we would decline his use of the word *irritation* as vague in pathology, and fallacious in therapeutics.

The sense in which Mr. Travers uses the term is considerably different, but as he does not attempt to give a definition of it, it is difficult to render in a few words an explanation of his views. He seems to apply the name irritation to any disorder of sensation or function, whether of the nature of depression or excitement, that is not attributable to inflammation or to injury of the mere mechanism of parts. It is chiefly through the nervous system that the phenomena of irritation manifest themselves; and this constitutes the character which most distinguishes irritation from inflamma-

tion: but the relation of these two states of disorder must be as intimate as the connection between the nervous and the vascular systems is close and reciprocal. But it will, perhaps, more nearly represent Mr. Travers' view of irritation to say that it is a morbid modification of the irritability of a part or system. Here we are naturally led to inquire what *irritability* is, and what is its healthy proportion and mode of action. Of irritability it can only be said that it comprises the vital properties of a part or tissue, and is shared in various proportions and forms, by the different organs and textures of the body. If there is any rule observed in the distribution of this natural irritability, it is not in the ratio of sensibility, vascularity, or muscularity, but rather according to the importance of the organ in the functions of life. It is much more largely possessed by some individuals than others; and various circumstances, external and internal, are capable of producing a great variety in its proportion in the same individual. An excess or deficiency of natural stimuli, or the operation of noxious agents, will convert healthy into morbid irritability; and again, if the share of irritability possessed by an organ be morbid, natural stimuli will produce irritation. Thus an irritable stomach may be nauseated and disordered by many ordinary articles of diet; an irritable bladder is continually parting with its contents before the stimulus of distention can be supposed to act: an irritable heart becomes tremulous and palpitating whensoever its action is excited; an irritable skin breaks out in a rash from many slight causes of excitement both of diet and temperature. The description which Mr. Hunter gave of irritability in a morbid sense, "over-action to the strength of the parts," and an irritable habit defined as "an increased disposition to act without the power to act with," accord with Mr. Travers' views of the subject, which are further exhibited in the following passage. "Extreme susceptibility and consequent over-activity are invariably coupled with and most probably dependent on weak and insufficient powers of constraint and resistance. The same principle which renders a part over-irritable renders it over-active. The balance of the system, adjusted by the state of even health, is disturbed by the preponderance or deficiency of either of its active functions, as by the imperfection and disease of either of its organs. A weak organ or constitution is one easily put out of order, because it is continually excited to greater activity than it has power to support,—greater, therefore, than is consistent with the harmony of the system. But action may be morbidly excessive or deficient, independently of organization; and this irregularity, although occasional at its commencement, may become habitual. A too irritable, nervous, or vascular function is, therefore, as marked a constitutional peculiarity as irritable lungs or skin. In a physical as in a moral sense, every individual has a weak part, and this observation would as often apply to the function as to the organ. Circulation, or respiration, or nutrition,

in one or other of their many intricate processes, is below par in tone. The absorbent capillary function is below par in scrofulous habits, the arterial in the leucophlegmatic, the venous in those disposed to local congestions; the exhalent in the dropsical; and the pulmonary, gastric, hepatic, and renal, are respectively the failing functions in persons who eventually become the subjects of asthma, gout, jaundice, and stone."*

This quotation, although referring only to susceptibility of irritation, will be sufficient to show the extensive view in which Mr. Travers applies the term under consideration. Irritation in this sense cannot be defined otherwise than as a disorder arising from a want of balance of functions. But as no disorder can exist without more or less of a loss of balance of function, it is obvious that there is nothing in this definition which can distinguish irritation from disease in general. It is, in fact, more according to their causes than by any common character in their symptoms that Mr. Travers groups the cases of disease as instances of irritation, and this is perhaps (especially as far as it relates to surgery) the most practical method of arrangement.

Irritation may be either local or general; that is, one or more organs or parts may be its seat, without the rest of the body partaking of the disorder, in which case it is local; but when the principal functions become affected, the irritation may be called general or constitutional. Local irritation may sometimes become extended to the system, and thus become constitutional; this occurs in cases of severe external injury or disorganization, such as extensive burns, compound fractures, &c. Mr. Travers makes a further division of cases of constitutional irritation into two kinds, direct and reflected. Direct irritation is that wholly and immediately derived from a local source of irritation, the constitution having no share in its production, and is, therefore, proportionate to the local cause. Reflected irritation, on the other hand, originates in a peculiar morbid state of the constitution, is purely idiopathic, and being oftener the cause than the effect of local disordered action, is seldom influenced by local treatment. The symptoms characterizing direct constitutional irritation, are, in the nervous system, rigor, delirium, convulsion, coma; in the vascular, the fever of phlegmonous, suppurative, ulcerative, and gangrenous inflammations. Those which belong to reflected constitutional irritation are, in the nervous system, epilepsy, tetanus in all its modifications, and other anomalous forms of spasm, mania, &c.; in the vascular system, the fever accompanying erysipelas, scrofulous and carcinomatous inflammation, carbuncle, &c.

The division which Mr. Travers has thus made appears to be abstractedly just and natural, and in extreme cases it is sufficiently easy to distinguish between the local and the constitutional origin of disease. But the more numerous cases of a mixed description, where

* On Constitutional Irritation, p. 15.

sympathies and re-actions are multiplied and complicated, and where local disease and a disordered constitution affect each other with equal or balancing forces, will seldom bear an exclusive reference to either of these divisions, and it would be unsafe to found practice generally upon them. They are unquestionably more applicable to surgery than to medicine; and it may be said that a principal part of the *medicine of surgery* consists in a due apportioning of the treatment between the local and the constitutional disease. The enumeration of symptoms, which we have quoted above from Mr. Travers' work, would give to the word irritation nearly as extensive a sense as that in which it is accepted by M. Broussais, since inflammatory and all kinds of symptomatic fevers are included under it, and, physiologically speaking, they are so with great justice; but in a practical point of view, seeing that these affections, whatever share irritation may have in them, have their distinct names and their peculiar and varied forms of treatment, it would seem to us more desirable to limit the term irritation to those affections which partake of the character of excitement or increased vascular action, without the precise characters of fever and inflammation. Irritation undoubtedly attends all inflammations and fevers, but then its phenomena merge in those of the phlogosis or pyrexia, which in a specific and peculiar manner modify the course and determine the issue of the malady. Constitutional irritation is a state so distinct from inflammation, that it has been remarked, and very justly, that in its characteristic form it is incompatible with it; the former ceasing to exist when the latter is established. It must, however, be admitted, that these two states pass into one another by gradations that it is often impossible to distinguish. Irritation may be considered to be the introduction or preliminary state to inflammation: it is the mobile part of it, and being transferred from one locality to another, draws the phenomena of inflammation after it. But it may exist independently of inflammation: certain additional circumstances are required for the production of the latter; if these are wanting, and the source of irritation still exists, a variety of phenomena ensue, expressive of excitement and disorder of function. What these additional circumstances are, we cannot absolutely specify; but a certain degree of plethora and power in the vascular system are elements which seem to be required before irritation can produce a true inflammation. It is such a plethora and susceptibility of the vascular system which constitutes the phlogistic or inflammatory diathesis; and where this is strong, irritations even of a mild nature may readily become extended to the vessels and pass into inflammation. Where, on the other hand, the vascular system is ill filled and of low power, any irritating cause failing to excite it to inflammation develops its effects in various other modes, such as disorder of sensation, secretion, and other functions, the nervous system being apparently the medium through which the irritating influence

acts. Between the states of pure irritation and perfect inflammation there are, however, numerous intermediate gradations, in which the phenomena of irritation beyond what usually accompany inflammation manifest themselves, and prove, even in disorder, an unequal balance in the systems. So general is this fact that there is not a malady of any kind in which more or fewer of the signs of irritation are not *occasionally* apparent, and the history of irritation in this sense would extend to varieties of the whole catalogue of diseases. Such a view would be far too extensive for the due limits of this article. We shall, therefore, merely give a sketch of the pathology of irritation in general, and conclude by a notice of the most remarkable examples of the different kinds of irritation.

Of irritation in general.—The introductory view which M. Broussais gives of irritation is far less objectionable than the indiscriminate and unqualified application to which he afterwards extends it; for truly, the reference of disease to changes in the physiological properties of tissues, if unbiassed and comprehensive, is, as far as diseases of the solids are concerned, a fair and natural basis of pathology. But to specify contractility and sensibility as the only properties of tissue appears to us to be too hypothetical to be admitted as the ground-work of a doctrine; and as there is no necessity for analyzing functions, it is better to treat them simply as they present themselves. Neither are we inclined to adopt the dogma of M. Broussais, which is only a modification of that of Brown, that there is always an equal quantum of excitability in the system, and that an increase in one part necessarily produces a diminution in the other, and, therefore, that there is no such a state as general asthenia or as general excitement.

The functions of animal structure are relative; certain circumstances excite or increase, and others diminish or depress them: exciting agents are called stimuli or irritants; those which depress are called sedative. The relation of an irritant to a function is *irritation*; but the signification of the word here is twofold, for it implies, 1, the agency or act of irritating; 2, the effect or the excited state of the function. It is not unimportant to observe this distinction, and as the construction of our language does not admit of it in the word itself, we shall endeavour to restrict *irritation* to the latter meaning, and describe the other as the *irritating influence* or *act*. Without attempting to explain them, it will be convenient to represent the living properties in general by the word irritability, which merely denotes their relation in the abstract to irritants. There is a certain share of irritability natural to the healthy state of every part, and the moderate operation of natural irritants upon this constantly induces that degree of irritation which constitutes healthy function. Irritation in a morbid state implies excess, which, when great, sufficiently declares itself by the disorder or loss of balance that ensues; but in smaller degrees morbid irritation is as hardly discerni-

ble from healthy as slight disease is from health.

Irritation may arise from an excess of irritability in a part independent of external circumstances, so that the ordinary or habitual stimuli become irritants; or it may proceed from an additional irritating influence from without. Thus vomiting is a symptom of irritation of the stomach; and it may arise from excessive irritability of that organ, as in gastritis, and in the sympathetic irritations of the stomach from concussion of the brain, diseases of the urinary organs, pregnancy, &c.; it may on the other hand proceed from the additional irritating influence of an emetic or of indigestible food. So, likewise, irritation of the mucous membrane of the lower intestines may manifest itself by diarrhoea; and this irritation may proceed from the over-irritating quality of the contents of the intestines, as in bilious diarrhoea, and the operation of a drastic purgative, or from the excessive irritability of their membrane, as in dysentery, lentergy, &c. Again, the urinary bladder shews signs of irritation when subjected to the unusual stimulus of gravel or stone; and the same phenomena are presented when, either from disease in its coats or by sympathy with some adjacent parts, as in stricture of the urethra and rectum, scirrhus uteri, ascariides, &c., the irritability of the bladder is inordinately increased, and it is continually parting with its natural contents. This division of the modes of irritation is useful, inasmuch as it points out a distinction which is sometimes of the greatest importance in practice, but it is one that cannot always be made; for the two modes frequently unite, and an excessive irritating influence very commonly induces an unnatural irritability of the part to which it is applied. Thus, after an emetic or other irritating substance has been rejected from the stomach, the organ continues for a while morbidly irritable, and refuses to retain the blandest liquids; and the bladder often remains irritable after all the gravel has passed away. Again, when the irritability of a part is low, what is commonly an irritant may fail to produce irritation. Thus an emetic sometimes fails to excite vomiting; crude and indigestible food may pass through the stomach, and fæces may accumulate in the intestines without injury; worms may inhabit the viscera, and gravel lie in the bladder, without any remarkable signs of irritation in the respective organs. The same remarkable difference in the susceptibility of irritation is observable in the same individual under different circumstances, and even simultaneously in different parts of the same system. To say that this susceptibility of irritation depends on the degree of sensibility is only to adopt another mode of expression without making the matter more plain. It is generally under the influence of a new or additional irritation that a part becomes awakened to the presence of irritating matters of which it was before insensible. Thus an inefficient purgative frequently develops the irritating influence of fæces long accumulated in the cells of the

colon; an excess of diet renders the urinary bladder sensible of the pressure of a calculus hitherto latent; a fit of indigestion occasions irritation of a tumour or other organic disease in the brain to produce a fit of epilepsy. But it is through the medium of the nervous sympathies, which produce what is called constitutional disturbance, that local sources of irritation are most frequently excited. Any thing that disturbs the balance of the functions in general is sure to be felt in the weak or disordered part; and a cause of irritation, which may be long latent during the quiet and equal action of functions, is thus called into activity by any general exciting influence, and, if extensive, often reacts with great energy on the constitutional disease. Again, a local irritation frequently extends itself to the various functions of the system, generally affecting them irregularly and singling out a weak organ, which becomes a new seat of irritation, whilst the original evil receives back with interest, by the same channels of sympathy, the disturbing influence that it had engendered. This interesting subject has been ably treated by Abernethy, Travers, and other eminent writers on medical surgery; and its importance is generally admitted in modern practice. We here allude only to its principle, which is not dissimilar to that of the cases already noticed.

We have hitherto represented irritation as the result of a stimulus or exciting influence, whether the undue relation reside in the irritability of the part, or in the external influence applied to it. The nature of this relation is necessarily obscure, as it is involved in the mystery of the properties of organized matter; and we must therefore at present rest contented with observing the fact. But there is another source of irritation which it is important to notice, equally proceeding from the operation of a prevailing law of organized structure. There is in the living powers a kind of resiliency, or disposition to reaction, which manifests itself after the application of any influence that tends to depress or destroy them; this property often converts sedatives into indirect irritants. Thus cold is in itself a sedative; but the re-action, which succeeds to its application, renders it a fertile source of inflammation and irritation. The worst mechanical injuries and severe burns and scalds are likewise sedatives in their immediate effect; and when extensive, this is sufficiently apparent in the syncope, suspension of sensation and function, and even death, which they occasionally produce. There are many instances on record of death supervening on severe accidents, such as the crushing or tearing of limbs, compound fractures, violent blows on the head, epigastrium, or thorax, &c. in which it could not be ascribed to loss of blood, or mechanical injury of any of the vital organs. The death of patients under severe surgical operations without hemorrhage may be attributed to the same cause, assisted often by the powerfully sedative influence of fear and pain. A remarkable and instructive illustration of the

influence of mechanical injury may be drawn from the experiments of Legallois, Wilson Philip, Majendie, and others, in which it appeared that violent and extensive injury done to the brain and spinal marrow of animals caused an immediate cessation of the action of the heart, whilst the removal of the whole or any part of these organs in a state of integrity produced no such effect. Bruising or roughly lacerating the brain, or forcing a coarse instrument into the spinal marrow, seemed in these cases to exert a positively noxious and sedative influence on the heart. A more intelligible cause of prostration is loss of blood; but this, although it certainly is so when syncope and death are its immediate consequence, is not, as we shall presently see, so complete and general a sedative as some of the other influences which we have named. Other evacuations and privation from food are essentially of the same nature, but the gradual manner of their operation gives occasion to various signs of re-action, which disguise their direct effect.

The immediate operation of all these causes (and they constitute a most numerous class, for contagious effluvia, malaria, septic and other pestiferous influences may be added to the list,) is unquestionably sedative, or that of prostration; and if the powers of the system should be insufficient to resist or rally from it, they succumb under it. This is the very reverse of irritation; yet, strange to say, it has been commonly confounded with it; and it is when applied in this way to such opposite affections, that the word has lapsed into an indefinite acceptation. If the powers of the system are not subdued by the prostrating or sedative influence, there will then be re-action, in which they usually tend to pass the limit of moderation and regularity, and irritation and excitement ensue in the functions, various in kind and degree, according to the share of power which they severally retain. This appears to be a general rule in the animal economy, and we are not required to go further for an explanation of the reaction which forms a prominent part in many diseases. This reaction may be partial and injurious, as where it displays itself in convulsions, vomiting, hiccup, palpitation, cramps, &c. These symptoms have been called indications of prostration, and so perhaps they may be admitted to be with regard to the system at large, but certainly not in respect of the organs which they affect; in these they are unequivocal signs of excitement or increased action. They are proofs of impotent and misdirected reaction, and if not seconded by a re-animation of the organs more immediately concerned in the support of life, they exhaust the excitability of the system, and accelerate the extinction of life.

Another remarkable symptom of reaction is rigor. The addition of this sign to those already mentioned implies a greater degree of power in the system; and in many instances it precedes the development of the highest degree of reaction. Thus it is the first sign of fever,

in which it is followed by a series of irritative movements of an intense and general kind. On the other hand it is the symptom of healthy and moderate reaction from syncope; and it frequently succeeds to the sedative impressions of cold without any violent irritation ensuing. It may be represented to be a slight convulsive motion, the object of which is to give an impulse to the circulation of the surface. When reaction becomes more general and perfect, it verges on fever, which may be inflammatory or nervous, according to the prevailing strength of the sanguiferous or the nervous system. But it is to the degrees short of fever and inflammation that we here restrict the application of the term irritation, and in these we find many, but not all, of the functional disorders which attend fever. There is a marked perversion of the functions of circulation, respiration, and digestion. In the former we see a quickened and irregular pulse, with deficiency of force and firmness in the heart's action; whilst alternations of pallidity and flushings betoken an equally irregular tonicity of the capillary vessels. The breathing is anhelatory and distressed; and this sometimes depends on the irregular state of the circulation, and sometimes on the irritation affecting with spasm the bronchial muscles. The powers of digestion may be often said to be almost annulled; a total inappetency for food marks their defect; and we need only allude to the loaded state of the tongue and to the vitiated excrements, as a presumptive proof of the existence of an adequate cause in the depraved state of the visceral secretions. The sensorial functions are likewise variously affected by any irritation extensively present in the body. The sensations and perceptions are commonly exalted and acute, while the other mental powers are below par; hence an irritability of temper and depression of spirits are generally observed; and the loss of balance sometimes amounts to delirium, which is usually of the morose or angry kind.

In the various symptoms that are thus presented in diseases of irritation, we should err were we to expect to trace constantly the features of excitement. It is the loss of balance which is most apparent; and although there must be some undue and misdirected excitement or irritation in some part of the system, the remaining functions will generally (but not necessarily) suffer from prostration and weakness. The more general states of fever and inflammation, through the vascular system which they essentially affect, in their marked and acute forms, entail irritation and excitement of a more equally diffused kind; but irritation, as we consider it, may be confined to a function or organ, while the remainder of the system is suffering from decided asthenia. Thus the stomach and bowels may exhibit irritation in profuse secretions and inordinate movements, whilst other secretory and motory organs are in a state of complete inactivity and prostration. The mamma and the testis sometimes present a form of irritation in an excessive sensibility or constant pain, without any

apparent excitement or weakness in their vascular structure. It is in fact a degree of relative, not absolute weakness, that characterizes irritation through all its range of degrees. The excitement takes effect partially only, and the parts unaffected do not contribute to carry the orgasm through a series of processes by which it is at length exhausted, as in the case of inflammation; but if the cause continues, the irritation may persist for an indefinite time, occasioning more or less mischief and disturbance, according to the importance, in the system, of the balance which it destroys. In the greater number of instances of irritation, the vital powers are enfeebled; and this constitutional weakness is the reason why the excitement does not become general and pass to the state of fever or inflammation; but absolute debility is not essential to the existence of irritation; since the most perfect inflammations and sthenic fevers commence with simple irritation, and this is a stage in all cases of reaction. The persistence or protraction of irritation certainly implies relative, and in most instances, general weakness; for the existence of power would lead either to general reaction and restoration of balance, or to the more powerful process of pyrexia and inflammation. The operation of the morbid virus received into the system through wounds in dissection strikingly illustrates two modes of irritation. Its local effect is that of direct irritation, while its action on the system is that of powerful prostration, against which the feeble and irregular reaction of the vital forces develops another kind of irritation. If in such a case inflammation begins in a part, it seldom exhibits the vigorous and decided character of healthy inflammation; but occupying the capillaries principally, and unseconded by any energetic action of the other parts of the vascular system, it takes on an erythematous form, while the effusions are serous or sanious, destitute of coagulable lymph, the plastic effect of which tends to limit and restrain phlegmonous inflammation. The variety of signs which this complication of disorder may present is very considerable; but they principally depend on these two causes—the noxious or sedative influence of the poison, and the irritation resulting from an imperfect and irregular reaction of the vital powers against it. For a full and interesting detail of examples of this kind we must refer our readers to the work of Mr. Travers, before quoted.

We may, in conclusion, sum up the kinds of irritation under three heads:—

1. Those caused by *direct* irritants or stimuli, whether acting immediately on the part, or mediately through the nerves.

2. Those caused by a preternatural irritability, which, independently of any new exciting influence, renders the relation of ordinary circumstances a source of irritation.

3. Those caused by *indirect* irritants, or those influences which, although in themselves prostrating or sedative, become irritant through the reaction of the vital powers against them.

This division must be admitted to be in

some measure artificial, inasmuch as few examples of irritation occur in which one only of these kinds of causes prevails. They, particularly the first and the second, frequently become engrafted one on another, and occasionally all coexist; but still the greater number of cases are sufficiently stamped by the prevalence of one or other of these kinds of irritation, to render the distinction available in practice.

1. *Diseases of direct irritation.*—Of this kind is the disorder resulting from all sorts of slight mechanical injury, whether by contusion, super-extension, puncture, incision, or laceration; from extraneous substances, tumours, effusions, and accidental productions; chemical irritants, too long retained or vitiated excretions; dentition, crudities, and worms in the alimentary canal, calculus in the urinary or biliary passages, and many others. Irritation in all these cases is undoubtedly the result of a reaction of the vital powers, the object of which is salutary, being the removal of an irritating matter, or the reparation of an injured part. Whether there be a state prior to reaction which can bear the name of prostration in these cases, as well as in those of the third class, is a matter of merely speculative and not practical interest, since we can detect in their history no other than a direct mode of irritation. The reparation of an injured part depends mainly on the vessels obeying the impulse of irritation; and unless there be a peculiar defect of power in them, the disorder passes into the more healthy state of inflammation. Where this defect subsists, there may be either the imperfect inflammatory action which we see in erythema and erysipelas, or no inflammation at all, and then pain and disordered function or secretion are the signs which attend irritation. It is for the same reason that injuries of tendons, ligaments, fasciæ, and other fibrous membranes, commonly exhibit more of irritation than of inflammation; they are not liberally supplied with vessels, and the irritation, instead of speedily terminating in the reparatory or suppurative process, lingers longer in the part, with pain, serous effusion, &c. sometimes exciting, sympathetically, severe constitutional derangement, and even tetanus. In the irritation resulting from the application of mechanical or chemical irritants, the salutary object of the reaction is more apparent. Thus, if a grain of sand or salt fall on the conjunctiva, the pain and irritation excites a copious secretion of tears, the tendency of which is to remove the offending matter. Mucous membranes, when irritated, throw out viscid mucus to protect themselves. When a thorn or a needle penetrates the skin, an irritation is produced, which tends to inflammation; this by effusion limits the irritation to the immediate vicinity, and by suppuration removes the irritating matters. But, on the other hand, irritation may fail of its salutary end in all these instances. The grain of sand may remain lodged; the mucous effusion be inefficient as a shield; and the vascular power may be insufficient to effect the process of the expulsion of the thorn or needle;

and then the irritation becomes a disease of more permanent character. So worms in the intestinal canal will irritate the membrane of the bowels in every variety of way but a salutary one. Thus they may affect the nerves, occasioning by sympathy grinding of the teeth, convulsions, disordered appetite, various pains, palpitation, &c. The vascular system may likewise be excited, and mucus poured out in great quantity, the peristaltic motion accelerated, without dislodging the offending bodies; whence diarrhœa, with tormina, depraved excretions, thirst, atrophy, and other constitutional disorders, may ensue. The same description will apply to scybalous fæces lodged in the cells of the colon. Indigestible food and excess of acid or acrid secretions in the stomach irritate it in a variety of ways: if the sympathies of the muscular apparatus related to it are quick and susceptible, vomiting is excited, and the end of the irritation accomplished. But if these are not sufficiently roused, the irritation will cause other sympathies and uncomfortable feelings, both bodily and mental; whence arise gastrodynia, pain in the chest, incubus, palpitation, asthma, headach, vertigo, hypochondriasis, &c. The signs of irritation may proceed from such a variety of organs that it appears to be in a manner reflected from one to another. Thus irritation in the bowels is transmitted to the brain and spinal marrow, and from thence develops its effects on the voluntary muscles, producing spasm, convulsions, or chorea. If the original irritation persist long in this direction, it may become fixed on the nervous system, and there continue long after the irritating influence has been removed from the intestines; the disorder of the nervous system may then be considered to be of the second kind of irritation, that, namely, of increased irritability. Calculus of the urinary organs frequently produces irritation of a still more disturbing and unprofitable kind, which has worn down the feelings and functions of many a frame. Dentition is another fertile source of irritation in the bodies of sensitive children. As long as this is restricted to the production of a copious flow of saliva or a moderate diarrhœa, it can scarcely be said to be prejudicial; but it not unfrequently amounts to generally disordered secretion, wasting diarrhœa, and atrophy, convulsions, and paralysis; none of which effects tend in any intelligible way to promote the progress of the tooth through the gum. Tumours in the brain or spinal marrow may excite epileptic convulsions, chorea, paralysis agitans, &c. Accidental productions, as tubercles, produce various signs of irritation, both local and sympathetic. Thus, in the lungs they occasion cough, in the bowels diarrhœa, &c., whilst their presence almost always irritates the heart and quickens the pulse. Foreign bodies or splinters of bone in the substance of living structure frequently occasion severe irritation, with little or no decided inflammation. It may declare itself by pain and spasm in the part, and in the system by disorder of any of the functions, quickened pulse, hurried breathing, impaired digestion,

delirium, convulsions, tetanus, &c. Pus confined within the proper sheath of a tendon, under a fascia, or within any dense and unyielding tissue, may produce similar phenomena.

Such are examples of direct irritation, and many others might be adduced; as the history of numerous diseases, medical and surgical, abounds in instances of the same kind; but we do not profess to enter into details, and enough has been said to illustrate the principle. Nor shall we do more than allude to another important and extensive cause of irritation, which we cannot hesitate to call direct,—inflammation. It is a cause not only sympathetically, or through the intervention of the nerves, but likewise by mere contiguity. Thus inflammation of the pulmonary pleura excites irritation and consequent inflammation in the corresponding part of the costal pleura; and the same thing gives origin to the adhesions observed between the heart and pericardium, and the peritoneum in its various points of contact. The physical nature of this mode of the propagation of inflammation is involved in much obscurity; and although there are not sufficient grounds to identify it with electric or galvanic action, it is obviously something beyond vascular or nervous communication. But through sympathy an organ or part affected with inflammation produces irritation in various other organs; this is fully exemplified in what is called symptomatic fever, which can be referred to no other principle. It is, moreover, especially remarkable in the sympathetic relations which subsist between particular organs, as the mucous membrane of the stomach and bowels, and the brain. And here, while we would acknowledge the truth and importance of the views of M. Broussais on these points, we would insist still on the propriety of distinguishing between inflammation and irritation. The secondary or sympathetic irritations may truly pass into inflammation; but they more generally fall short of it, and therefore require a different treatment; and it is a point important to be observed, that instead of being in proportion to the intensity of the primary inflammation, they are often most prevalent when this is very slight. Thus the cerebral and general irritation accompanying well-marked gastritis is considerably less than that which gastric derangement, or what the French call "*embarras gastrique*," will produce. It would, perhaps, more nearly represent the reality if we say that the sympathetic disorder is in proportion rather to the irritation of the organ primarily affected than to the intensity of the inflammation. This predominance of irritation over inflammation, although occasionally occurring in the robust, is a character more remarkable in individuals in whom the nervous system has the ascendancy, whether by natural constitution, or in consequence of the depression of the vascular power by evacuations or inanition. It is thus that in delicate females visceral inflammations are often accompanied by irritation and disorder quite disproportionate to their intensity or extent.

Certain mental emotions are frequent causes of bodily irritation, and they act in a variety of ways. Anger, joy, and surprise, (which act as general stimulants on a healthy body, and as if they tend to produce disease at all, it is congestion or inflammation,) when the bodily powers are in an enfeebled state, become direct irritants, and develop that partial and irregular excitement among the functions and sensations which we understand by the word irritation. They exert their stimulant relation almost exclusively on the nervous system, which in this condition of the body has already a disproportionate ascendancy, and they may thus greatly increase that loss of balance which is so much opposed to the state of health. Thus we see the necessity of excluding all such influences from those whose functions are in that state of weakness or depression which continually verges on derangement; such are convalescents from fever and other severe diseases. Grief, fear, and anxiety are indirect irritants, and must therefore be referred to the third head.

2. *Irritation from excessive irritability.*—We have already adduced examples of this kind in the case of the stomach after the evacuation of an emetic during pregnancy, or suppression of urine, and under the influence of concussion of the brain, and other injuries or shocks to the system. The intestines, when once excited by an irritant, sometimes present a continuance of irritation apparently from the same cause; and the irritability of the urinary bladder is known to be morbidly exalted in diseases of the adjoining parts. Inflammation is, however, the most common cause of excessive irritability; and it is in some measure a question whether the above examples may not be referred to a state more or less akin to it. But we see parts sometimes remain permanently irritable without any obvious increase of vascularity; and as there is reason to suppose that sensibility is not always in proportion to the number and size of the vessels, it would not seem just to attribute the excessive irritability of an organ always to inflammation or even to congestion. Mr. Travers considers that the irritable joint, breast, testicle, and prostate gland, give no evidence of inflammation. He records instances of irritable breast and knee-joint, attributed originally to needles having entered the parts, which continued painful many months after the extraction of the needles, in the total absence of inflammation. The facial nerves in those affected with tic douloureux present examples of excessive irritability; a draught of cold air or the heat of a fire is enough to irritate them and the adjoining muscles into pain and spasm. The bronchial muscles are inordinately irritable in those subject to nervous asthma; and trifling causes, such as the effluvia of a stable, excite them to spasm. Other idiosyncrasies might be quoted in proof of excessive irritability as a cause of irritation. After an irritation has been transmitted for a considerable length of time from one organ to another, the latter sometimes adopts the habit, and continues to show signs of the same disorder after the original

irritating cause has been removed. This is instanced in chorea, arising from feculent accumulations or disordered secretions in the intestinal canal. When these have been removed or restored to a healthy condition, the chorea sometimes continues, and can only be removed by remedies directed to those parts of the nervous system in which the irritation has become fixed.

The uterus, in the irregular performance of its periodic function, is frequently the seat and focus of irritation. The nervous excitement, or *innervation* as Andral terms it, by which a flow of blood is called to this organ at particular times, may fail of its purpose, and instead of being relieved by the establishment of the catamenial discharge, displays its effects in the various forms of what is called hysteria. In this there may or there may not be local plethora; if there be, the fault of relief must be in the secernent vessels of the uterus; but if there be not, the defect is probably in the sanguiferous system, so that they do not answer to the call. Each of these cases has its separate class of symptoms originating in irritation; but as hysteria and other derangements of the uterine function are fully considered under their respective heads, we do no more than name them. Many other examples might be adduced to illustrate this mode of irritation; particularly in that numerous class in which a congestion or increased vascularity is the cause of excessive irritability; but it is unnecessary to go further. It is by producing a state of this kind, that direct irritants may become causes of this second order of irritations. We may remark that many of the following class of irritations might perhaps be referred to the same head.

3. *Indirect irritation, or the irritation of reaction.*—In developing the principle of this mode of irritation, we have already cited many instances of its occurrence: these may be greatly multiplied, for they are as numerous as the sedative or prostrating agencies to which the animal frame is liable; but it will be sufficient if we notice generally the forms which they most commonly present. There is probably a successive gradation of conditions from the slightest sign of partial reaction from the state of prostration, such as vomiting, rigor, and convulsion, up to a decided and violent reaction, bordering on inflammation and fever. All these we would designate as degrees of irritation dependent on the same physiological principle, and deriving the variety of their aspect from the number and force of the functions which take part in the reaction. We sometimes see it confined to a single organ; thus the stomach shews it by vomiting, the diaphragm by hiccup, the brain by delirium; whilst all other organs may remain in the state of prostration. Of this description is the effect of violent and extensive injuries or burns, and severe operations, in which the powers are almost overwhelmed by prostration, and the partial effort at reaction, instead of counteracting it, contributes to render it complete and fatal. The pulse here is quick and threadlike, the respira-

tion short and suspirious, frequently with a general rhonchus throughout the chest; if there be no delirium, the intellectual and sensitive faculties are in a state of hebetude approaching to stupor; the pupils are dilated, and the eyelids half closed; the countenance pallid or livid; the surface and extremities cold; the secretions, if not suppressed, are unnatural; and the sphincters often fail in their office. All these are signs of direct prostration, and among them the irritation of reaction may declare itself in a solitary symptom, and in none more commonly than in vomiting, which is often indomitable to the last, and greatly hastens the fatal event. It seems to proceed from extreme irritability of the stomach, which rejects the blandest liquids. A low delirium, with various hallucinations of the perceptions, may equally accompany this state; it is a sign of the irritation of reaction in the brain, and is prejudicial both in being misplaced reaction, and by leading to bodily efforts which add to exhaustion, and not uncommonly prove instantaneously fatal. Convulsions arise in the same way, and produce similar effects. Such is exhaustion with the lowest signs of reaction. In other cases irritation takes a larger share in the diseased state consequent on the injuries under consideration. Thus, after rigors, the pulse may become sharp and bounding, with throbbing in the head; the eyes glassy, with contracted pupils; the delirium fierce, or there is great restlessness and morbid sensibility: spasms may occur in various parts of the body; there may be pain in all degrees and positions; the heat may be partially increased, although the extremities are generally cold. Here, although beginning in prostration, the chief features of the disease are those of misdirected and excessive reaction. They border very closely on fever and inflammation; and it would be rash to say that they are always distinct from these states: but although the delirium and exalted sensibility are sometimes so marked as to give suspicion of the existence of phrenitis, examination of the brain after death discovers no sign of increased vascular action further than some turgescence of the vessels, which is totally disproportionate to the intensity of the symptoms. Other organs, the lungs, the heart, the stomach and intestines, but particularly the serous membranes, are occasionally the seat of this kind of irritation, which puts on the semblance of inflammation; but less commonly in reaction after local injuries or operations, than after prostrating causes which have a more diffused seat in the system, such as cold, loss of blood, and inanition. The general tendency of all these irritations is to exhaust, and unless controlled and counteracted, they wear down and destroy the remaining irritability of the system, and death necessarily ensues.

It is the continued impression of a sedative or prostrating influence that renders reaction imperfect, and converts it into an injurious irritation. Thus the powers in general may be unable to rally after the first shock of any severe injury or operation; but this inability is frequently dependent on some additional sedative

influence, bodily or mental. Fear and anxiety are most powerful in this way; and instances are on record in which operations, trifling and favourable in their surgical relation, have led under their influence to a fatal result. Women have died after successful and natural parturition, barely from the effect of a presentiment that they would die. To such instances cited in Mr. Travers' work before mentioned, he adds a case of the death of a lady after a labour protracted unusually by the evolution of a polypus after child-birth; and another of a gentleman who died in twelve hours after the escape of the contents of the stomach by perforation into the peritoneal cavity—ascribing these fatal events to the sudden, extreme, and unremitting pain: but we question whether they may not be as fairly attributed to exhaustion from muscular effort in the first case, and in the latter to the prostration of the heart's power by the severe and extensive injury to the peritoneum, as in other cases of acute peritonitis. Pain, although commonly at first a powerful irritant, when exceedingly severe occasions syncope, and by fatiguing the powers otherwise produces a prostrating effect: in this way it will tend powerfully to subdue the disposition to general reaction. It implies the worst species of mental excitement, which entirely prevents the repose essential to restorative reaction; but as we sometimes see the body bear pain even in its greatest degrees with impunity, and as we know that a certain integrity of the functions is necessary for its continuance, we can scarcely look on it as being ever alone a sufficient cause for fatal prostration. The sedative influence of grief and fear is so decided, that they may not only aid other causes, but by themselves destroy by prostration; and this may, as in other cases, be with or without irritative reaction.

But the most remarkable species of causes of irritative reaction are those which depend on inanition, whether arising from bloodletting or other evacuation, or from imperfect nutrition. We owe to Dr. Marshall Hall the first distinct notice of these morbid affections: his observations have been confirmed by Dr. Abercrombie, Mr. Travers, Dr. Gooch, and other subsequent writers; and he has since given a fuller account of them in his "Researches on the Effects of Loss of Blood," a work recording some new facts of great practical importance.

The immediate morbid effect of loss of blood, if extensive, is the same as that of the other prostrating influences which we have mentioned, syncope, coma, convulsions, and delirium. The two latter, although they appear closely allied to the others, we cannot but view as different in their nature, and as resulting either from a partial effort of reaction, or from a remnant of local power, preponderating unduly over general prostration. They most frequently occur where the excessive loss of blood has been gradual, as by atonic hemorrhage, epistaxis, by bloodlettings often repeated, or through a small orifice and in the recumbent posture. The gradual draining of the system in these ways, or by other excessive

evacuations, such as continued purging, and by starvation, which have the same effect in the feeble, after the lapse of these symptoms frequently gives rise to a train of signs of irritative reaction of more prominent and decided form. There will be palpitation of the heart, with quick and jarring pulse, and throbbing of the carotids, aorta, and other arteries, and the auscultator will perceive a purring or grating sound in these parts. If this irritated state of the circulation continue, it will induce its effects on the sensations and functions; sensibility will be increased, with intolerance of light and sound, pain, throbbing, and noises in the head, an excited state of the mind amounting to delirium, a loaded tongue, and general disorder of the secretory functions.

This condition, which is amply described by Dr. M. Hall in the work before quoted, and in the articles BLOODLETTING and ABSTINENCE in these volumes, is a fair example of irritation in its characteristic form. Here is great excitement and disposition to act, but no power to regulate or support it: here are the nervous phenomena of inflammation without that permanent and powerful state of the vessels which can lead it to any of its usual terminations. The semblance of inflammation which it frequently presents often induces the practitioner to draw more blood; the evil consequences are sometimes immediate, syncope, convulsions, and death; and when there is a temporary amelioration, it is only a prelude to a worse return of irritative reaction. So great is the real weakness in the midst of all the apparent signs of excitement, that the erect posture or any kind of exertion may prove fatal. It may terminate fatally also in a more gradual way, by passing again into the state of sinking or pure prostration; and here likewise it may put on a fallacious aspect in its resemblance to the signs of effusion on the brain. In children particularly, this imitation is so close that Dr. M. Hall has called it the hydrecephaloid disease. In favourable cases irritation terminates in subsidence and a gradual restoration of power, and with it a recovery of balance among the functions. But the irritation may pass into a chronic state, and of this description Dr. Hall considers puerperal mania, amaurosis, deafness, paralysis, &c.

The delirium, mania, and increased sensibility in those suffering from privation of food, recorded in several cases by Dr. Currie, Dr. Latham, Andral, and others, are obviously of the same nature of irritations of reaction; and in the pain of the head and stomach, and irritable state observed in those under the influence of a great and sudden lowering of diet, we see a more familiar illustration of the same kind. Similar symptoms often accompany the wasted and atrophied condition of infants unduly nourished, with whom the maternal milk disagrees, or whose powers of digestion cannot master the food that is given them; and they not unfrequently develop themselves in the asthenia lactantium, and in any form of undue nutrition. For further illustrations, see

the articles ABSTINENCE, CHLOROSIS, and DISEASES OF LACTATION.

Treatment of irritation.—Having described irritation as a general pathological principle rather than as a specific disease, our remarks on the remedial measures calculated to counteract or remove it must be equally in the abstract, and merely illustrated by prominent examples.

The removal of the irritating influence, if possible, is the most obvious indication in the cure of direct irritation; and in the slighter cases this may be a sufficient remedy. Thus, the removal of irritating matter from the stomach by means of an emetic; from the intestinal canal by a purgative; the counteraction of acidity by a dose of alkali; relieving by a stroke of the lancet the tension of the swollen gum in dentition, or of the integuments or a fascia in superficial or deep-seated abscess, may amount to a complete cure of the various forms of irritation, which these causes severally occasion. But it is not always possible thus to reach the root of the evil: moreover, as we have already remarked, when once planted, the disease propagates itself so as in a degree to become independent of its first cause, and thus to belong to the second class of irritations. Hence it often becomes necessary to combine, with the measures directed to remove the irritating influence, others calculated to diminish irritability; and where the original cause is obscure or baffles our efforts, this is the only system of medication that can be pursued. This combination is the more expedient in intestinal irritation, as the remedies suited to remove the offending cause in themselves for a time aggravate the irritation. Thus it is proper in such cases to give before or with the purgative some narcotic, such as hyoscyamus or opium, and further, if necessary, to allay the irritation of its operation by diluents, the warm bath, and other derivants. It is not easy to lay down any rule by which the relative importance of these measures can be decided; but the sedative plan is generally more requisite in proportion to the length of time and the degree in which the constitution has suffered under the irritating influence. Where the irritation is vehement, and disturbs in a serious degree the vital functions, it becomes of more importance immediately to allay this by temporising measures, than to rest solely on those which are more radical, but of slower operation. A child suffering from worms or accumulated feces may die of convulsions under the additional irritation of a purgative before its evacuant effect can be obtained; but if this medicine be preceded by or conjoined with others calculated to soothe, such as hyoscyamus, Dover's powder, or the warm-bath, according to the character of the irritation, its operation will be safe and seasonable. The purgative is, moreover, by the same means, often rendered more effectual for the removal of the irritating matter, since its slower progress enables it to act more generally on the canal, than where an excessive irritability hurries it precipitately

through. So also, during the prevalence of violent spasm, an antispasmodic must often be promptly administered without regard to the duration of its effect. To give ether, laudanum, assafoetida, valerian, &c. in spasm of the glottis or bronchi, or in violent palpitation of the heart, may be, in relation to the cause of the irritation, a temporizing measure; but it is using time to good purpose.

We have enumerated inflammation among the causes of direct irritation, and we again allude to it for the purpose of remarking, that besides the removal of the cause itself, our attention may sometimes be usefully directed to the quieting of those nervous sympathies by which the irritation is communicated to the system at large. This, we apprehend, is the principle of the salutary operation of opium in continued fevers and the less sthenic forms of inflammation; and did we possess a medicine that should be sedative to the nervous system without exciting or disturbing the vascular, it would furnish a still happier and more satisfactory illustration.

There are many cases in which the source of irritation is organic, or beyond the reach of remedies; it is thus with tumours in the brain, spinal marrow, and other parts, accidental productions, cancer, and other forms of diseased structure; here our only resource is in measures which allay morbid irritability. We shall have occasion presently to revert to this subject; but we see no need to dwell longer on means for the removal of irritating influences; they vary with the nature and locality of the influence.

There is another mode of treating direct irritations, which it may be convenient to notice in connexion with direct irritation, although it is more frequently applicable to the indirect kind, namely, by stimulating applications. In enumerating examples of direct irritation we named various mechanical injuries, and remarked that the object of irritation in these cases, the reparation of the injured part, is sometimes defeated, and the disorder prolonged in consequence of the low power in the vascular system, which is inadequate to take on the reparatory state of healthy inflammation. Here, then, an additional stimulus to the vessels, conjoined, if need be, with a sedative to the excited nerves, will often recal the irritation from its prejudicial wanderings through the system into a local and salutary channel. This treatment is obviously applicable only in cases where inflammation is not in itself a hurtful process, such as mechanical injuries and sores of the exterior, and especially burns and scalds. The efficacy of stimulating applications to the latter is now generally admitted, and we would attribute it entirely to this principle in all the moderate examples of these lesions. The extreme heat has so paralyzed or weakened the vessels, that although they may be entire and congested with blood, they require a new and powerful stimulus to bring them to that activity of function which the reparation of the injury requires. When a part has been disorganized, and is insusceptible of revivification, and the

adjoining vessels are weak and inactive, stimulant applications are still more obviously indicated to excite that inflammation which is necessary to effect the sloughing or separation of the noxious dead matter from the living structure. We can see the utility of a similar treatment in other forms of external disease, where the inflammation is at once irritative and powerless.

We have already glanced at the treatment of our second order of irritations, that of excessive irritability, for the mixed manner of their occurrence renders it inexpedient to consider each kind quite separately from the other; but we return to the subject, in the endeavour, as far as is possible, to make this sketch of the principles of the treatment correspond with the preceding pathological history. Excessive irritability, as we have there remarked, most frequently depends on inflammation or some of the states akin to it, or (to use the more comprehensive words of M. Andral) hyperæmia in its several forms. In such cases relief is to be sought in the various antiphlogistic measures, applied of course with due relation to the organ whose morbid irritability is to be reduced; and thus evacuants, derivants, counter-irritants, and contro-stimulants, become remedies for irritation. These are considered in the article INFLAMMATION sufficiently to supersede notice here, further than the remark that their anti-irritant may not always be in the ratio of their antiphlogistic effects; and where irritation predominates over inflammation, those are to be preferred which act on the nervous as well as on the vascular functions; thus, counter-irritants (and if they be admitted as a separate class, contro-stimulants also) will avail more than mere vascular depletories in fulfilling the indication in view. For example, in the vehement irritations connected with slight phlogoses of the mucous membranes of the lungs and of the alimentary canal, (notwithstanding Broussais' positive assertions to the contrary,) tartar emetic frictions for the former, and sinapisms and blisters for the latter, are far more efficacious than local or general bloodletting. The irritations of serous membranes, which in persons of mobile sensibility frequently present the semblance, although they partake little of the real character, of inflammation, likewise receive most relief from this description of antiphlogistic treatment. The contro-stimulant or sedative influence of cold directly applied is exerted equally on the vessels and nerves, and it would be, doubtless, a powerful means of subduing irritations, were it a more manageable agent; as it is, we see its beneficial influence in the relief afforded to cerebral irritation, and in those of the limbs by applications of ice and cooling lotions. The expediency of using it, (as do the Broussaïans,) in abdominal and thoracic inflammatory irritations, is very questionable: the risks of repelling the inflammation more inwardly, and of its being aggravated by reaction if the application of cold is unsteady or insufficient, besides the obvious injury to the system of continually abstracting from organs that degree of heat which is almost

necessary to their life, are surely sufficient objections against a practice that is far from being generally recommended by the experience of its advocates. External heat, whether dry, as applied by hot flasks, bricks, or air, and acting as a rubefacient, or combined with moisture in fomentations, baths, or poultices, and proving revulsive and sudorific, is a much less exceptionable remedy for internal irritations. In its moderate degrees the latter are more suited to inflammations, as their effect is principally on the circulation, which they soothe and equalize; but in its highest tolerable degree, heat produces a strong impression on the nervous system; very hot flasks, or flannel wrung out of water almost scalding, are among the most powerful of antispasmodics or local anodynes, and we have seen them produce perfect and immediate relief in the irritative pains of colic and dysmenorrhœa, where many powerful narcotics had failed.

As we are now verging on the subject of means directed particularly to lower nervous irritability, we may premise that there are some narcotic or sedative remedies which, if they do not act as such on the vascular system likewise, do not stimulate it; they are, therefore, often admissible in inflammation itself, and are the more strongly indicated when it exhibits the character of nervous irritation. Of these, none for safety and general applicability ranks before the hyoscyamus. Mr. Travers says, "In the ruffled states of the system generally, but especially in the over-active state of the vascular system, there is a charm in the operation of henbane altogether peculiar. It is feeble as an anodyne, feeble as a soporific, but 'not poppy nor mandragora' soothe and still so unexceptionably as henbane." This remark, although true, requires a comment; the over-activity of the vascular system here alluded to is not one of inflammation, but of irritation, dependent on excess of nervous irritability scattered through the different organic sympathies; and it is in its sedative influence on these that the charm of henbane consists; for it exerts little or no effect on inflamed vessels, that are, as it were, over-active in their own strength. We may almost say that on its little interference with the vascular system its general eligibility depends; for, restraining no secretions, it can advantageously be given alone or combined, without the risk of purchasing temporary relief at the expense of that balance of functions which is so essential to health; and unless where pain and excited sympathies are useful as guides in the employment of more active remedies, there is scarcely an instance of morbid irritation unfitted for its use. The main fault of hyoscyamus is its weakness as a narcotic; it not unfrequently fails of its effect, and, perhaps sooner than other remedies of the same class, loses its power by continued use.

Of the other remedies of this class we may mention favourably conium, belladonna, colchicum, digitalis, and hydrocyanic acid. Their fitness in various diseases is less extended than that of the medicine already named; and it is

particularly restrained by their greater liability to disagree with the stomach. The two first approach in their properties most nearly to hyoscyamus. The three others exert a decidedly sedative effect on the vascular system, but rather through an influence on the heart, the force and number of whose pulsations they diminish, than from any action on the vessels at large. Their beneficial effect is, therefore, best seen in irritations of this organ and of the lungs, which stand in so close a relation to the heart. The directly sedative influence of hydrocyanic acid is, however, sometimes remarkably evinced by its allaying the morbid irritability of the stomach; and it is successfully applied externally to allay the irritation of prurient eruptions. Colchicum is supposed to possess a specific sedative power in the irritations of gout and rheumatism. Whether this may depend on its carrying off through the kidneys an irritant matter from the blood is uncertain; but the diuretic effect of this remedy and of digitalis should not be overlooked. Conium and belladonna, when the system can bear them in sufficient doses, are sometimes very beneficial in allaying irritation of the pulmonary system, whether manifesting itself in spasm of the bronchi, or in an excessive irritability of the mucous membrane, exciting cough. The smoke of stramonium and of tobacco enjoys a similar reputation, but it is decidedly stimulant to the vascular system. Poultices of the recent leaves of various narcotic herbs, but particularly conium and belladonna, are very efficient in allaying the irritation of unhealthy ulcers: the leaves of the latter in form of ointment shew great power over both vessels and nerves, in relieving and preventing the chordees of gonorrhœa.

We pass over others of lesser note to the chief of narcotics, opium. This medicine, although under certain circumstances the most sure and most powerful of anti-irritants, has so many ulterior effects, that more than any other it requires judgment in its exhibition. Its first effect is to stimulate the vascular system, and this is sufficient to exclude it from all those instances of sthenic inflammation where it is wished to retard or arrest rather than to hasten this process. But in the asthenic phlegmasiæ, especially where nervous irritation predominates, the administration of opium is counter-indicated only by the ulterior effects which it may have in arresting the secretions. Combined with ipecacuanha, with antimony, and especially with mercury, it ceases to be liable to this objection, and its operation is often in the highest degree salutary. Even where it is wanted as a pure anti-irritant, to reduce morbid sensibility in the nerves, we should always prefer it in combination with ipecacuanha, which seems to equalize without injuring its narcotic virtues; and in further combinations, it is not common to experience from this compound the inconveniences that frequently result from laudanum or opium. The muriate and acetate of morphia, equally with Battley's *liquor opii sedativus*, enjoy the reputation of a purer sedative property than the common forms of the

drug possess; but unless where a speedy effect is desired, there are few cases in which we would not place greater confidence in Dover's powder, or tantamount combinations of ipecacuanha and the aqueous extract of opium. It is an almost indispensable adjunct to purgatives in violent gastro-enteric irritation, where hyoscyamus would be insufficient; and if the stomach will retain it, it seldom fails to quell the excessive disturbance that sometimes follows drastic and unguarded purgation. In dysentery, and in more chronic forms of excessive irritability of the intestinal canal, the proportion of ipecacuanha may with advantage be doubled or quadrupled, as in the dose of one-fourth or one-eighth of a grain of extract of opium, with one-half or a whole grain of ipecacuanha, repeated according to the urgency of the symptoms.

We must notice a more obscure class of remedies, alteratives, which, whatever may be their mode of action, are unquestionably entitled to a place here. Under this unscientific but convenient title, we reckon the various non-purgative forms of mercury, whether simple or combined with opium, those of antimony and ipecacuanha in acute diseases, and in chronic disorders minuter doses of the same, sarsaparilla, mezereon, chalybeates, and a host of other medicines. The efficacy of the first named of these in restraining and subduing inflammatory action would obtain for them, among the disciples of the new Italian doctrine, the appellation of *contro-stimuli*; but this, like cutting the Gordian knot, is only substituting a bold stroke of hypothesis for a solution of the difficulty. It is not impossible that tartar-emetic and mercury may exert on the coats of inflamed or irritated vessels such an influence as directly neutralizes or subdues their disorder, and restores their healthy function; but this is a large assumption to take for granted; and in the absence of any sort of positive proof, we think it safer and as philosophical to arrange the remedies in question under the modest title of *alteratives*. These remedies are powerful in subduing irritation; and on the basis of the views which we have given of this morbid state, we might equally well frame an hypothesis that they act by restoring a lost balance, and by equalizing the distribution of natural irritability. But we will content ourselves with remarking the fact, that mercury, antimony, and in a minor degree ipecacuanha, tend moderately and equally to restore all the secretions which inflammation and irritation arrest or pervert; whilst opium, deprived in this combination of its restraining qualities, happily allays the excited sensibilities and sympathies of the nervous system. The alteratives prescribed in chronic irritations, although in greater variety, probably act on the same principle; and, perhaps, the exhibition of what are called alterative doses of blue pill, Plummer's pill, ipecacuanha, dandelion, and sarsaparilla, and mineral waters in chronic diseases of the viscera and skin, is more generally acknowledged as an appeal to the various secretions.

Before passing to the last class of remedies, tonics, we would advert for a moment to the salutary effect of friction and exercise in allaying morbid irritabilities of a part of the system. They hold an intermediate place between alteratives and tonics, and in affinity with either they well merit consideration. Friction, steadily and moderately applied, is an efficient anodyne. Although injurious in acute inflammations, it allays in a wonderful manner various nervous pains, spasms and other disagreeable sensations connected with irritation and irregular circulation, and it is a valuable auxiliary to anodyne applications. It is an alterative to the vascular system, inasmuch as it removes congestions and obstructions, and promotes healthy circulation and secretion; and in the regular continuance of these effects by exercise, increased by the contact of pure air, consists the tonic power of these hygeian agents.

The utility of tonics in subduing morbid irritabilities will, if we mistake not, be sufficiently apparent from the pathological views which we have endeavoured to expose. Agents which give tone and strength to the vascular system will destroy the preponderance of that nervous mobility which is the basis of irritation. Under their prosperous influence, disposition and power to act will go together, and within due bounds produce the harmonious balance of even health. Whether certain of them possess a specifically sedative property towards the nervous system, or whether this is their secondary effect after their tonic and astringent influence on the vessels, is beyond our means of decision; but the fact is not less ascertained than important, that the continued use of nitrate of silver or sulphate of copper will cure the epileptic irritations independent of organic cause, and often diminish them where the cause is irremovable, by lowering in the nerves their susceptibility to its impressions. Thus, likewise, bark, carbonate of iron, arsenic, sulphate of zinc, or subnitrate of bismuth, sometimes remove the painful or spasmodic irritations of tic douloureux, hemicrania, sciatica, chorea, and gastrodynia, which the most powerful anodynes, antispasmodics, and counter-irritants fail to affect. The stomach and intestinal canal, likewise, under the influence of a bitter tonic, will often lose various signs of irritation, which, however they may occasionally be accompanied by slight hyperemia or fancied inflammations, owe their being to weakness and want of tone. The cold shower or plunge bath or cold ablution is another efficacious tonic; the more eligible often, because, without loading the system with medicine, it rouses it to the exertion of its own powers in a vigorous vascular reaction, under the habit of which nervous mobility is physically forgotten and ceases. But it is needless to add to examples which have been adduced only as illustrations of a principle.

We have, finally, to glance at the leading peculiarities required in the treatment of indirect irritation, or that arising in the reaction after prostration. The most obvious indication is to promote and regulate the reaction, so that it

may rise to the point of a general and equal recovery of function, without passing beyond it into a state of irritation or inflammation. The most common state which we have to deal with is that of irregular reaction, local and misdirected excitement amidst general prostration. Whether this excitement consist in convulsion, hiccup, vomiting, delirium, palpitation, or cough, it is of the utmost importance that it should be subdued; and to effect this, it is of more avail to direct our efforts to excite the powers generally by diffusible stimuli than to attempt to quiet the local irritation by sedatives; for as the other powers rise from the prostration, this symptom will generally subside. But should this not be the case, and the local irritation be wearing down the strength, sedatives must be addressed to it; this part of the treatment will not differ from that of morbid irritability already considered. The point which characterizes the treatment of this form of disease is the necessity for counteracting the prostrating influence which paralyzes the plurality of the functions, leaving others in proportionate predominance. This indication resolves itself into the removal, as far as is possible, of this influence, and the further obviation of its effects.

Cold and the resulting prostration are removed by the same means, the gradual and cautious restoration of heat, beginning by frictions with snow, &c. and carefully restraining the disposition which is commonly manifested to excessive reaction; on this account diffusible stimuli are only sparingly admissible. See COLD.

The prostrating influence of a severe mechanical injury, as of a crushed limb or bad compound fracture, seldom ceases on the removal of the limb; on the contrary the additional shock of the operation not unfrequently proves fatal. The absence of inflammation leaves the system open to the noxious influence of the shattered structure, which inflicts a stroke felt even after its removal. Were healthy inflammation soon excited, this would probably in a degree counteract or interrupt this influence; and we hazard the suggestion that stimulating applications made to the injured part previously to the operation, might, as in extensive burns, be of more avail than mere internal stimuli. The existence of inflammation in the system has been shown by Dr. M. Hall to protect it in a remarkable degree against the prostrating effects of loss of blood, and the same thing obtains in some measure in other cases of prostration; hence asthenic inflammation may be useful not only as proving power in the system, but also as a general tonic, imparting a stimulus to the heart and vessels. This remark is most applicable to surgical cases, in which inflammation is an important and necessary process; but we see in it also an explanation of the utility of artificial inflammations excited by sinapisms, blisters, and stimulant frictions, in failure of the powers from various causes, and in the state of sinking from any severe disease. Any of these measures as local counter-irritants and

general stimulants often prove beneficial in arresting vomiting, hiccup, convulsions, or any other partial reaction amidst general prostration. In the worst cases, however, they fail to excite inflammation; for the skin, like other parts, seems to have lost the attributes of vitality.

Of the diffusible stimuli fit to oppose the state of sinking or prostration, the most powerful are ammonia, alcohol, and opium. These are variously applicable according to the degree to which the depression has extended. Ammonia is the most purely stimulant, and is, therefore, best adapted to cases in which there is least of local irritation, or where this manifests itself in spasms. The complete prostration induced by tobacco, digitalis, and other sedative poisons, and the asphyxia from the fumes of charcoal and sewers, are examples to which the stimulus of ammonia seems to be especially adapted. The carbonate of ammonia is the most common preparation, and it is conveniently combined with alcohol in the *spiritus ammoniæ aromaticus*, which is the form most agreeable to the stomach. It is to be borne in mind, however, that it is a chemical agent as well as a vital stimulant; and this circumstance precludes its being given to a very large amount. Spirit in the various combinations, brandy, wine, and ether, is a highly valuable stimulant; and it is the one perhaps most to be depended on in general prostration with irregular reaction. It exhibits some narcotic virtue in its property of quieting the irritated sympathies of this state, and is peculiarly serviceable in arresting the severe vomiting which often severely and fatally aggravates various forms of exhaustion. It is of the greatest importance to watch most assiduously the state of a patient who requires a large exhibition of stimuli of this kind, both to ensure their being supplied often enough, which in case of sinking must be done every five or ten minutes; and to diminish or withdraw them the moment they produce an effect on the circulation, lest they stimulate it beyond the point of moderate and general reaction into a state of febrile excitement. Opium, as it partakes largely of narcotic as well as of stimulant properties, is less adapted to the extremest forms of prostration than to those in which the irritability of the system is misdirected. In the state of sinking, when the respiratory function is failing with the rest, opium might have the effect of destroying the sensibilities and sympathies on which this vital process depends. But for the different partial irritations attendant on general weakness, particularly delirium, spasm, palpitation, and hiccup, opium is generally the most satisfactory remedy. Solid opium and its tincture are here the most expedient forms; and their stimulant effect is most fully developed by small doses frequently repeated. If the antispasmodic property is desired, larger quantities must be given; and it is truly astonishing what doses the system will bear when under the influence of spasmodic disease.

The first objects in extreme prostration are, to sustain the functions of respiration and cir-

ulation by diffusible stimuli, until there is a sufficient recovery of the forces to support these without further aid. The organic functions of secretion and assimilation then generally require some assistance; for the effects of the depressing influence sometimes manifest themselves on them after the circulation has been restored to some degree of vigour. Here alteratives and tonics come into requisition; and, as in direct irritation, they must be variously modified and combined in order to ensure the most equal and natural excitement of the several organic processes. Where the prostrating influence still remains in the system, counteracting vigorous reaction, and enfeebling or paralyzing all the conservative powers, these several remedies must be conjoined. Thus, under the noxious influence of gangrene, asthenic erysipelas, or poisoned wounds, it becomes necessary to administer wine or spirits, ammonia, opium, or camphor, with bark or sulphate of quinine, whilst the secretions are excited by calomel or blue pill. Bark has sometimes a signal power in combating with the depressing influences in question; and its efficacy may, perhaps, depend on the same property which renders it so complete an antidote to the causes of intermittent fevers.

The irritation of inanition, in respect to its symptoms, may require in great part the same treatment as that from other causes; thus sedatives to the nervous system, and the exclusion of all sensorial excitements, will be equally necessary. But the nature of the causes may modify the indications: as they consist in a loss from the system, the necessity of supplying nourishment for the reparation of that loss, giving to the assimilatory organs the aid of additional stimuli, is obvious.

It is necessary to be on our guard against the invitations which these forms of disease sometimes hold out for the use of antiphlogistic measures: these afford but temporary relief to the pseudo-inflammations which arise in this state, and which are more safely and effectually subdued by sedatives, a judicious supply of nourishment, and an exclusion of all exciting or disturbing agencies. Thus we may see a disease following extensive evacuations, which puts on the semblance of violent pleurisy, pericarditis, arachnitis, or hydrocephalus, often completely relieved by hyoscyamus or opium, with a sustaining nourishment, such as sago, arrow-root, or jelly, with small quantities of brandy or wine. The state of the circulation is the safest guide in the conduct of this treatment; as long as the pulse is weak or fluttering with its quickness, and although sharp or jarring in its first impulse, yet leaves the artery in the intervals empty under the finger, the sustaining treatment must be continued, and local pains, palpitation, disturbance of the mind with beating or noises in the head, viewed as partial reactions, to be subdued by opium or hyoscyamus rather than by the lancet and evacuations. But if these symptoms have been relieved, and the pulse has recovered in a measure its steadiness and fulness, the spirits and other stimuli must be diminished or withdrawn,

and the rest of the cure left to time and to whatever alteratives circumstances may suggest. These points are more fully described under the heads of the several diseases connected with this subject, and which have been already referred to.

The prophylactic treatment of those liable to irritations will generally consist of those means which, by giving tone to the vascular system, remove the preponderance of nervous influence or susceptibility. These are tonic medicines and a tonic regimen in general; but if there be already a loss of balance in the vascular system, it will be generally necessary to direct some alternative to regulate it. There are various circumstances of diet and regimen which tend greatly to engender a general morbid irritability; particularly an habitual and excessive indulgence in spirituous liquors, smoking, very strong tea or coffee, and opium-eating; close or crowded habitations, and a sedentary mode of life. Besides avoiding these predisposing causes, those who are of an irritable habit should rise early and keep regular hours, use exercise in a bracing air freely, but not so as to induce much fatigue, live on food of the most wholesome and nutritious kind, and attend in every possible way to the promotion of equality and regularity of the functions.

(C. J. B. Williams.)

ISCHURIA RENALIS.—The generic term ischuria has been employed not only by medical writers in general, but by professed nosologists, men of high reputation, to designate two very different affections. Thus by Sagar, ischuria has been defined "retention or suppression of urine secreted by the kidneys, or suppression of the secretion in the kidneys." Sauvages, in his definition, uses the term *retention*; Cullen that of *suppression* only. The first of the above-mentioned authors seems indeed to have recognized a distinction between the one and the other affection, though he has not laid it down with sufficient perspicuity. Sauvages and Cullen evidently regarded retention and suppression as equivalent terms; yet to distinguish them accurately is of great importance, and, in treating of the only species of ischuria which belongs to the province of the physician, it shall be our endeavour to avoid confusing the one with the other. We would tread in the steps of modern writers, eminent for the soundness of their views and justness of discrimination; of Dr. Good, among others, who has assigned to complete suppression of urine the appellation of "*paruria inops*," while to obstruction or retention of the secretion in the kidneys he has given the name of "*paruria retentionis renalis*." In accordance with his view of the subject, yet retaining the term ischuria as one more familiar to the medical world, we may speak of the former under the title of *ischuria renalis suppressionis*, and of the latter under that of *ischuria renalis retentionis*. Suppression or destitution of urine may occur as an idiopathic affection, or as the result of other local or general disease. The causes of idiopathic suppression are involved

in considerable obscurity; probably, however, they are to be sought for in some affection of the brain and nervous system, producing palsy of the kidneys, or in a congested state of the emulgent veins.

Cases of idiopathic suppression are certainly rare, though perhaps not so rare as some authors have imagined them to be. The affection may be described, sufficiently for every practical purpose, in very few words. In an individual, generally one of full habit, inclined to corpulency, and past the meridian of life, the secretion of the kidneys becomes suddenly and completely suspended; but as there has existed little or it may be no previous indisposition, as there is no provocation to pass water, no pain or sense of weight in the lumbar region, no fulness of the hypogastric region, or of any part of the abdomen, the patient probably disregards the suppression for several hours, till, being seized by a rigor, or experiencing an unusual degree of heaviness and oppression, he deems it prudent to resort to medical advice. The medical man finds his patient complaining of some nausea, and of torpidity of the whole system, and with a pulse somewhat slower than natural, yet still with so little pain and so free from distention or any other very distressing or urgent symptom, as to entertain no apprehension respecting the result himself, and to be regarded perhaps by his friends as fanciful and nervous. The catheter is employed, it passes freely into the bladder, but no urine follows. At this juncture, whatever may be the impression of the patient or his family, or of unscientific observers, the experienced practitioner will descry no small danger. His prognosis will be decidedly unfavourable. He is well aware that the constituent principles of the urine cannot long be retained in the blood without being productive of serious mischief. To save the patient, the kidneys must be roused to action, and that speedily; they must resume their functions, or their important office must be assumed by some other organ. Now to stimulate the palsied kidneys to action is by no means an easy task, and the remedial efforts of nature or the resources of art may prove too feeble or too tardy to compensate effectually for the destitution of the discharge from the kidneys. In a few hours vomiting and hiccup supervene, the torpor of the system increases, the brain especially is oppressed, and generally on or about the second or third day from the commencement of the suppression, the patient dies comatose, as in a state of apoplexy.

In some of these cases a strong urinous smell is perceptible before death, evidently proving that nature was endeavouring to convert the exhalents of the skin into a substitute for the palsied kidneys, but was not able completely to succeed.

Such, usually, is the rapid and fatal course of idiopathic suppression of urine, which, as has been already observed, is generally a disease of elderly people. Cases, however, are on record where the suppression continued for a much longer period without danger, and the

subjects of which were young persons or children. As a striking example of these chronic and less dangerous cases may be adduced one, copied from a foreign journal into the *Medico-Chirurgical Review* for April of the present year. The subject of this singular history was a boy, twelve years of age, who, it is stated, secreted no urine for seven weeks, though all that time he partook freely of liquids. The bowels acted naturally every second or third day; there was no increase of perspiration, but the contrary; the appetite was tolerable, the sleep sound; the boy was to all appearance healthy. It is added that there was no suspicion of deception either on the part of the patient or of his friends. At the end of the seven weeks, turpentine injections and frictions were employed, and balsam of copaiba was administered internally. Why these remedies were not had recourse to earlier is not explained; it would appear, however, that they had the effect of exciting the action of the kidneys in two days. To this certainly marvellous relation the able editor of the *Medico-Chirurgical Review* has subjoined one very similar, which fell under his own observation. In this latter case it was impossible deceit could be practised; the catheter was introduced almost every day, but a few drops of blood only followed. There was no affection of head, nor is any mention made of increased perspiration or of diarrhoea. Various other instances of complete suppression of urine, which subsisted for a long time, and were unattended with danger, are recorded by Dr. Parr, Dr. Richardson, &c. Nay, some cases have been mentioned where the affection has been coeval with the birth of the individual. May it not, however, be suspected that a more severely critical examination of such cases would have led to the discovery that *some* urine (a very small portion it might have been, but that *some* urine) was secreted and passed? We must always remember, as has been justly remarked by Sir Henry Hallford, that a very small measure of urine is sufficient for the exigencies of the constitution, and that it is the *total cessation* of the secretion that is so uniformly fatal.

Or, if it be conceded that in these cases not a drop of urine was passed by the natural channel, or discharged at any foreign outlet; if, in a word, it be conceded that no *urine* whatever was secreted, might not more accurate investigation have determined them to belong to the ischuria suppleta of Sauvages?

It may be proper in this place to say a few words respecting this latter variety of ischuria renalis, in which the want of the secretion in the kidneys is compensated by a vicarious discharge, as also of that variety in which urine itself is thrown off by some foreign outlet. Cases of either description are uncommon, and, among those which have been published, some perhaps have been simulated; yet a sufficient number, distinctly related, and by writers of good authority, remain to entitle the ischuria suppleta of Sauvages and the paruria erratica of Dr. Good to our consideration.

The more usual emunctories which take up the office of the kidneys, are the skin and bowels; and several well-authenticated histories are to be met with in which we are assured that while not a drop of urine was secreted in the kidneys, there were most profuse perspirations, or diarrhoea, to such an extent as would, under different circumstances, have reduced the patients to an alarming degree. Occasionally the system has been relieved by vomiting of a fluid resembling urine as to colour, but yet altogether devoid of urinous smell or taste. But one of the most singular cases of vicarious discharge is that quoted by Sennertus from Platerus, of a girl thirteen years of age, in whom the secretion of the kidneys was compensated by a very copious flow of serous fluid from the right ear, which continued during several days. The relation occurs in the *Medicina Practica* of Sennertus, lib. iii. cap. 10.

That the suppression of the proper secretion of the kidneys should sometimes be compensated by a vicarious discharge, or, in other words, a secretion of a different kind, may not appear very extraordinary or difficult to comprehend; but when we approach the subject of erratic urine, there is much which we are at a loss to explain. If we suppose the kidneys not to secrete at all, how or where are we to imagine the urine to be separated from the blood? If we adopt what seems the more probable conclusion, that in cases of *uroplania* the fluid is first secreted in the kidneys, and afterwards is re-absorbed by the increased activity of the urinary lymphatics, still how are we to account for its being carried to the salivary glands, to the stomach, to the axillæ, &c.?—how are we to explain the fact of its having been detected in the ventricles of the brain? By what path and in what manner is it conveyed to the foreign outlet or the remote situation?

In the treatment of idiopathic suppression of urine, we should bear in mind the great probability of its depending upon a congested state of the brain or of the vessels of the kidneys themselves; and, if the subject of the affection be a person of full habit, if the pulse be slow and full, if there be a considerable oppression of head, we should not hesitate to employ general bloodletting, and that freely; if the above-mentioned symptoms be less marked, and the patient less plethoric, cupping from the neighbourhood of the head or from the loins may be sufficient. The abstraction of blood should be promptly followed up by the exhibition of a brisk purgative, as calomel with the compound gamboge-pill, succeeded, if need be, by a saline cathartic draught. In the event of these or other purgative medicines being rejected, remedies of a similar description must be administered in the form of enema, as, for example, oil of turpentine with castor-oil.

Having premised these general remedies, our attention should be next directed to the kidneys more particularly. We should employ stimulating diuretics, as small doses of oil of turpentine or balsam of copaiba, repeating them at short intervals; or, should these medicines

prove offensive to the stomach, the tincture of cantharides, with spirit of nitric ether in camphor mixture, may be given. Of the rest of this class of remedies the most important, perhaps, are the infusion and spirit of horse-radish, squill, and spirit of juniper. Of the *pyrola umbellata* and certain other reputed diuretics, our experience is far too limited to enable us to speak with confidence; and in an affection so important, and generally so quickly fatal as idiopathic ischuria renalis, we should scarcely think of resorting to remedies so little known, while others of acknowledged efficacy are within our reach. *Digitalis* has been recommended; but the only form in which its diuretic powers can be depended upon is that of infusion; and where a great disposition to nausea exists, we should be cautious in advising its exhibition in that form. If *digitalis* be employed at all in the present disease, it should be in combination with spirit. *atheris nitrici*, *tinctura cantharidis*, spirit. *armorac. comp.*, or other stimulants.

Opium has been proposed, under the notion of spasm existing in the vessels of the kidneys. Under such a view we should not have recourse to it, but in its combination with some other medicines, as *ipecacuan* for example, it may prove useful; for in the treatment of the disease under consideration, we must ever recollect that the excretions of the skin may assist those of the kidneys, and that, therefore, it is an important part of our duty to endeavour to excite the former, by active diaphoretics, to take upon themselves for a time the office of the latter, and carry off the urea which should be discharged by the kidneys.

Before concluding this part of our subject, we must strongly insist upon the importance of external remedies; of these the principal are electricity and galvanism, blisters, cataplasms of mustard and horse-radish, and *terebinthinate* frictions. The hot-bath may also be employed, or the *sudatorium*; the use of the latter, followed up by a full dose of *Dover's* powder or other powerful diaphoretics, will seldom fail to excite profuse perspiration.

But suppression of urine may occur as a result of other local or general disease; and then, of course, it will be attended by several symptoms in addition to those which are observed in the idiopathic affection. Thus, when it arises in consequence of renal inflammation, there will necessarily be considerable pain and tenderness in the lumbar region, with other symptoms of *nephritis*, hereafter to be noticed when we come to speak of that disease more particularly. When it proceeds from transferred gout, there will also be severe pain in the loins; and when it is caused by calculus, there will be weight and dull pain. Suppression of urine may also take place at the commencement of inflammatory fever. In all these cases our remedial measures must be directed to overcome the original disease. In proportion to the intensity and duration of the latter, will be the degree and duration of the suppression: with the cessation of the primary disease the suppression will cease.

Suppression of urine sometimes occurs towards the fatal termination of certain diseases. Under such circumstances nothing can be done.

Retention of urine in the kidneys.—We have now briefly to notice retention of urine in the kidneys. In this, as in the affection we have just been considering, there is no flow of urine; but in other respects it differs materially from suppression. In suppression the kidneys no longer secrete; in retention the secretions are not inactive, but the secreted fluid is obstructed in its passage. The obstruction may arise from a variety of causes. It may arise from spasm, from inflammation, abscess, or scirrhus of the kidneys; from hydatids, from calculous concretions, grumous blood, or viscid mucus in them; or from spasm or inflammation of the ureters; from calculi or other matters filling up their cavities; from their obliteration in consequence of ulceration; from tumours pressing upon them. The urine, though secreted in sufficient abundance, may be prevented from flowing into the pelvis of the kidney, or from thence into the bladder, by great enlargement of the gland. The same effect may also be produced by considerable extenuation of the kidney. Under this latter circumstance, though a small portion of urine may still be separated from the blood, yet, as the sinus of the organ contracts with its body, not a single drop may be able to pass into the ureter.

In most, if not in all, of the cases above mentioned, there will be dull pain, or a sensation of weight and uneasiness in the loins; and sometimes, as, for example, when the kidneys are greatly enlarged, there will be a fulness perceptible to the touch, or even to the eye; generally, however, owing to the peculiar situation of those organs, no intumescence is to be detected.

Complete renal retention is a very serious disease, inasmuch as it rarely takes place unless either both kidneys are simultaneously obstructed, or, one having previously been rendered incapable of performing its functions, the other, which had done double duty, becomes completely obstructed. It is not a common occurrence for both kidneys to be simultaneously affected; and in cases of absolute retention we may therefore conclude, or at least we may strongly suspect, that one of those glands has for some time been useless, or that one ureter has been impervious. Still, however, we must recollect that fatal retention has occasionally happened, though one kidney and its ureter have been wholly free from disease. For this we can account in no other manner than by supposing that the sound kidney is affected by sympathy; the irritation

produced by calculous concretions or other causes in the one organ may excite spasm in the other.

In the management of renal retention of urine we must be regulated by the cause, so far as we are able to ascertain it. Thus, if from the accompanying fever, and the violence of the pain, we judge it to arise from inflammation, we must employ general or topical bleeding, followed by mild aperients, and relaxants, and anodynes. If it appear to depend on calculus, mild aperients and relaxants may be all that the case demands; but here also, if there be considerable pain, venesection must not be neglected; and after venesection recourse must be had to anodynes. If the retention be in consequence of enlargement or hypertrophy of the kidney without evidence of inflammation, we are not to expect much from medicine. If both kidneys be thus affected, the case may indeed be regarded as hopeless. If one only be enlarged, the other probably will, for a time, take upon itself the whole duty; and a cure of the diseased organ may be attempted by the persevering exhibition of small doses of mercury, and the application of the emplastrum ammoniaci cum hydrargyro to the lumbar region. The well-known power of iodine in promoting absorption would point it out as an appropriate remedy in this state of disease: it may be employed in the form of its tincture; the dose being at first five or six minims, which may be gradually and cautiously increased to twenty minims or more,* three times a day; or the ointment of iodine, or of hydriodate of potass, may be rubbed in twice a day over the region of the enlarged gland.

If from the course of the pain, and the sense of weight, together with numbness of either lower extremity, and retraction of testicle, we suspect the obstruction to exist in the ureters, the only remedies from which we are to expect relief are relaxants and opiates. In this variety the retention is very rarely complete, for it is extremely uncommon for both ureters to be obstructed at the same time, or, when one is obstructed, for the other to be so affected by sympathy as to offer a total impediment to the flow of urine.

(H. W. Carter.)

ITCH.—See SCABIES.

* The words, *or more*, are added because we know much larger doses have been given, and, it is said, with impunity. Our own experience, however, is against large doses of that powerful medicine. Our astonishment has been very great on reading the treatment of a case of epilepsy by Dr. Franklin of New York, who, it seems, gave *one hundred drops* thrice a day for a month. See *Lancet* for July 30, p. 554.

END OF VOL. II.

LONDON:

MARCHANT, PRINTER, INGRAM-COURT, FENCHURCH-STREET.

